VOLUME 12 #3 MARCH 1997 PRICE $6

EXPERIMENTAL MUSICAL INSTRUMENTS

For the Design, Construction, and Enjoyment of Unusual Sound Sources

SINGING THE SOUND SONAMBIENT

In rural Pennsylvania, in the town of Barto, stands a barn. Within it there is a world of crashing, glittering sound. This is the barn in which the late designer and sculptor Harry Bertoia housed his collection of metal-forest sound sculptures, the extraordinary Sonambient® instruments. In their article starting on page 19 of this issue of *Experimental Musical Instruments*, Chris Rice and Ian Nagoski describe a visit to the Sonambient® barn.

Above: Colin Offord with the Great Island Mouthbow. See the article staring on page 13.

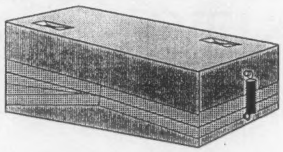
Another topic we address in this issue: Would it be possible to make a natural horn — that is, a bugle-like instrument without valves or slides — capable of playing a complete scale? Phil Ostendorf has been working on a system to generate the resonances within the valveless horn to make the missing notes playable. He describes his work in his article starting on page 23.

Also in this issue we have exquisite ceramic drums from Ken Lovelett. We have an industrial metal drum set and a rough-and-ready sound-sample controller from Keith Spears. Jan Jarvlepp describes his concerto for recycled garbage; Andrew Shoben discusses environmental sound installations from the artists' group Greyworld; and we hear from the man with the feathered mouthbow whose picture can be seen on this page.

And, as always, there's much more.
So open, and read.

PERHAPS YOUR READERS could help me identify the instrument I found in a thrift shop. It's foot-operated, pivots at the center, and is bellows-driven. On either side is a chisel-shaped whistle cut. Down on one side sounds the high note, and a spring returns the other side and sounds the low note. It sounds like some kind of oom-pah accompaniment, but who knows? Below is an illustration.

I need to repair the bellows to make it work properly, but it appears home-made. It's not very sophisticated, but seems to be based on a particular folk instrument. I love stuff like this!



Bill Houck
1306 Davis St., Chico CA 95298

THE GLASS ORCHESTRA WORLD WIDE WEB SITE is starting to turn into my dream of a historical collection of glass music and instruments throughout the ages. Look under the Online Catalog to see glass harmonicas, glass bells, a mystery antique glass xylo discovered in Thailand and much more.

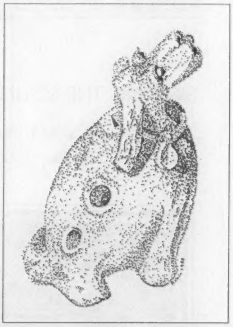
Please tell glass makers that we would like to have good-quality photos of their instruments and descriptions sent to us for possible inclusion on the site.

Eric Cadesky, The Glass Orchestra
211 College St., Suite 116, Toronto, Ontario, Canada M5T 1R1

POLYGENESIS OF THE PYROPHONE: here's an interesting e-mail exchange that came through the EMI's line's recently. It started with the following message from Adam Mishaga:

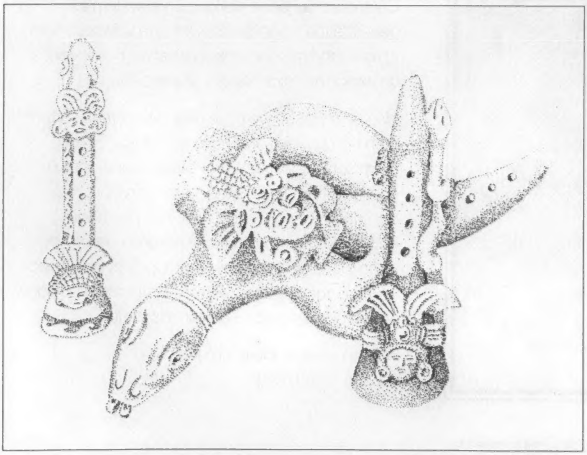
I came across your web page recently [http://www.windworld.com/emi], looking for experimental musical instrument resources online, and noticed a reference to something called a pyrophone. I was startled, because I developed an instrument several years ago that I also termed the pyrophone, and I'm curious as to the general design of the pyrophone you refer to. I'd love to see if two people came up with the same idea, design and name for an e.m.i. independently!

EMI's editor responded:



The basic idea (stated over-simply) is that a heat source such as a gas flame inside an open-ended glass or metal tube can, under the right circumstances, set up an audible standing wave at one of the resonant frequencies of the enclosed air. Assemble a bunch of these tubes and you can make something like an organ. Is that similar to what you've done, or completely different?

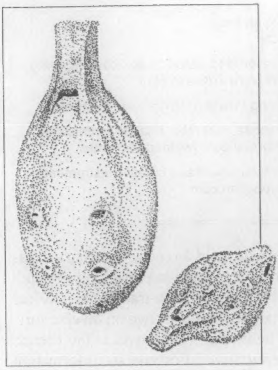
And Adam replied:



This is exactly the same sort of instrument I set up! Basically, I cut five large steel tubes, over 4' long and about 3" in diameter, to coincide with a C-based pentatonic scale, and mounted them on a rack built out of cheap zinc plumbing and a base of 2x4s and heavy casters for portability. By stuffing metal screening (the type used in porch screen doors) up into the bottom of the tubes, between 1/4 and 1/3 of the pipe length, and using two propane torches with the jet attachment removed, I got quite nice tones from all the pipes. It was definitely a finicky device, and required frequent adjustments to get the screen right at one of the nodes of the standing wave, but sounded great when it worked.

I'd love to hear about other people's modifications to the basic design of this instrument.

Adam can be reached at 955 Cranbrook Ct., #296, Davis, CA 95616.



Karen Rauter recently sent information on goings on at Woodstock Percussion, manufacturer and distributor of fine wind chimes and an array of other creative sound crafts. She writes:

I thought you might like to know what we've been up to in the last year or so.

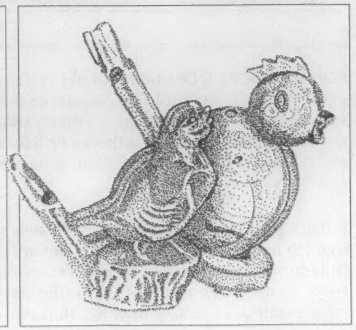
1. Anyone Can Whistle: we stopped doing the fancy 4-color catalog and reduced the operation to our one retail store, which has become a little community center for musical performance/resource/school tours, etc. [Prior to this, the enterprise known as Anyone Can Whistle had been operating as a catalog store carrying a wide range of creative sound items for children and adults.] We recently created a small mail piece to advertise the best of ACW since we're still getting requests for product and catalogs. We put a web site up at anyonecan.com so people can order that way too. There is sound on the site using Truespeech, which is, I think, too complicated for many people to bother with but that's how it is.

2. Our most recent popular new Woodstock Percussion product is called Woodstock Garden Bells, which was produced by us from a design by Ron Snyder. It is nine or so brass bells of different sizes blooming like flowers from a faux stone base. It's getting a lot of press since garden stuff is hot right now. The design is constantly being improved and is really something you might like.

3. We've created a line of "build-your-own" musical instruments for children. So far, we have done a Japanese Koto, an African Mbira, a Windchime and a Rainstick. The Mbira Kit won a gold award from Parents' Choice for 1996 and is extremely popular with parenting/educator publications.

Karen (Poglinco) Rauter
Special Projects
Woodstock Percussion 721 Rt. 28A, West Hurley, NY 12491;
e-mail Karen@chimes.com

Stipple drawings on these pages: flutes, whistles and ocarinas in various shapes and forms, from various parts of the world, from the pen of Robin Goodfellow.



IN THIS ISSUE

EXPERIMENTAL MUSICAL INSTRUMENTS
For the Design, Construction and Enjoyment of Unusual Musical Sound Makers

ISSN 0883-0754. Printed in the United States

EDITOR: Bart Hopkin ASSISTANT EDITOR/OFFICE MANAGER: Kim Johnson

PROOFREADER: Janet Hopkin

EDITORIAL BOARD: Donald Hall, Roger Hoffmann, Jon Scoville, Robin Goodfellow

Published in March, June, September and December by Experimental Musical Instruments, P.O. Box 784, Nicasio, CA 94946. Phone / fax (415) 662-2182.
E-mail ExpMusInst@aol.com Web Site http://www.windworld.com

Subscriptions US$24/year ($27 in Mexico and Canada; $34 overseas). Back issues & cassettes available;write for prices or see ads in this issue.

ADVERTISING POLICY: Experimental Musical Instruments will run ads which are potentially interesting or valuable to the readership. Please write for advertising rates. Subscribers can place "classified" ads of up to 40 words without charge.

SUBMISSIONS: Experimental Musical Instruments welcomes submissions of articles relating to new or unusual musical instruments. A query letter or phone call is suggested before sending articles.

NOTES FROM HERE AND THERE

GRAVIKORDS, WHIRLIES AND PYROPHONES
A NEW BOOK-AND-CD BOXED SET FROM EXPERIMENTAL MUSICAL INSTRUMENTS

The latest and greatest from *EMI*, produced with the publishing company Ellipsis Arts, is a book-and-CD combination devoted to new and unheard of musical instruments from some of the world's most interesting and inventive musical instrument makers. The package is full of informative text describing the instruments and the thinking behind them, augmented by wonderful photographs and great music. Every page and every track overflows with the ideas and the originality of the featured builders. 37 musical instrument makers appear in the book, with music from 18 of them included in the CD. Most of the makers are contemporary, but we've included a few seminal figures from the recent past as well. See the display ad on page 43 of this issue for a complete list.

The cost for the package is $29.95, and it's available from *EMI*.

A COUPLE OF COMING SOUND ART EXHIBITS

The 1078 Gallery in Chico, California will be presenting an exhibit in May of this year entitled *earart*, featuring sound sculpture, instruments and related sound art. Artists who might be interested in exhibiting should see the display ad elsewhere in this issue for information on submitting proposals.

The Oakland Museum of California presents *Hello Again: A New Wave of Recycled Art and Design* from Feb 15 through July 27, 1997. The show is an exhibition of innovative and often surprising products created from recycled and reused materials, and will include, among other things, a number of musical instruments. Among the materials used to make the exhibited objects are clothes-dryer lint, Wonder Bread wrappers, hosiery, melted-down guns, plastic soda bottles, out-of-date maps, rubber tires, junk mail, aluminum cans, old computer circuit boards, recycled corks, used kitchen appliances, and telephone wiring. The exhibit stresses, with pizzazz, the importance of recycling.

The Oakland Museum is at Oak and 10th streets in downtown Oakland, one block from the Lake Merritt BART station. For information, call 510/238-2200.

A FEW MORE URLS (addresses for sites on the internet) relating to musical instruments:

CHAOS's International Directory of Electronic Arts on the internet: http://nunc.com

Tai Hei Shakuhachi (new web site address): http://www.pacific.net/~shakuhachi

The Glass Orchestra's web site devoted to historical and contemporary glass instruments: http://www.io.org/~rixax/Glass.html

Big Briar's theremin information: http://www.nashville.net/~theremin

Dandemutande (organization for mbira, marimba, related Zimbabwean arts and culture): http://www.rootsworld.com/rw/dandemutande/

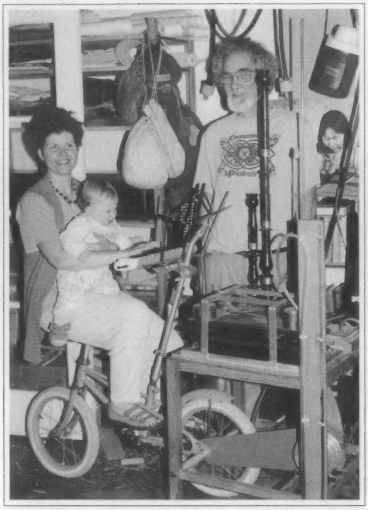
Anyone Can Whistle (retail outlet for unusual and creative instruments and sound crafts): http://www.anyonecan.com

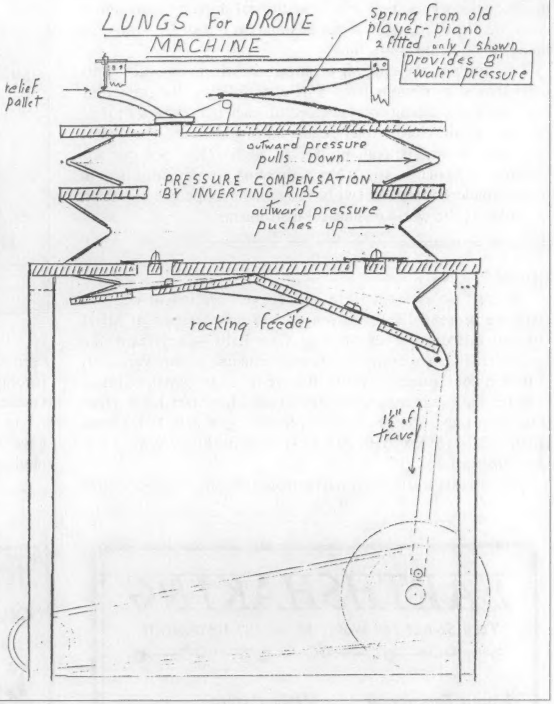
BRIEF MENTION: For those who read French, one journal has been particularly consistent over the years in presenting in-depth information on unusual traditional and non-traditional musical instruments. Every issue contains a feature or two on diverse sorts of instruments from around the world. The journal is the French percussionist's periodical *Percussions*. For contact information see the display ad on page 22 of this issue.

BOND ANDERSON SENDS ALONG THIS PHOTO of a musical playscape he designed and built at Coan Park, Atlanta, Georgia in 1996 for an Art Partners on Location grant. The instruments, from left to right: Tenor/soprano diatonic metallophone, box drums, diatonic marimba, box drums, diatonic bass metallophone, chromatic soprano metallophone, chromatic amadinda, "rainstick," diatonic amadinda. A pentatonic marimba is obscured behind the soprano metallophone.

ROBERT MOORE'S DRONE MACHINE is the instrument shown in the photo and accompanying diagram on the facing page. To sound the Drone Machine, the player sits backwards on the bicycle and back-pedals to drive the bellows which Rob calls the Lungs, causing the lungs to supply wind to a number of pipes. Rob provides more detail:

By back-pedaling the bicycle at a moderately slow pace it is an easy job for the Lungs to provide a constant supply of air at a fairly constant pressure. The relief pallet on top of the reservoir keeps the reservoir from over-filling, at the same time compressing the springs a constant distance, thus providing a constant





THE DRONE MACHINE

Photo above: Catherine Lewis, Rob Moore and a young friend at the Drone Machine

Diagram at right: The workings of the Drone Machine's bellows.

pressure.

Air from the lungs is used to selectively drive 1) three Irish (Uilleann)-style drones, all sounding D each an octave apart; 2) two Scottish-style drones, sounding G an octave apart; 3) one Southeast Asian mouth-organ with all five notes sounding together (sounds like a train), and 4) one Suzuki Melodion with a thirty-two note keyboard.

Rob cites the following work as an excellent source for information on bellows design: *Barrel Organ: The Story of the Mechanical Organ and its Repair*, by Arthur W.J.G. Ord-Hume (George Allen & Unwin Ltd., 1978).

RECORDINGS REVIEWS IN *EMI*: *Experimental Musical Instruments* regularly runs reviews of tapes and CDs presenting music of interesting and unusual instruments. If you have such a recording of your own music and you'd like us to consider it for review, send it along. Here are a few notes about our reviewing procedures and policies.

The purpose of the reviews is to let readers know what's available for their listening adventures. For that reason, we only review materials that are available for purchase. It doesn't matter if the packaging is major-label sleek or home-cassette grungy. We do need to know that the producer of the music is ready to respond to inquiries, and we need a dependable address to which we can direct readers.

Many recordings we receive never get reviewed. (If we tried to review all that come our way, the reviews would take up too many pages in each issue, pushing out other sorts of articles and turning *EMI* into a review magazine, which *EMI* isn't meant to be.) The choices regarding which recordings to review are a bit haphazard, depending to a degree on circumstance and chance. If in the end we don't review a particular recording, it should not be seen as a reflection on the merit of the material.

Due to our quarterly publication schedule and a number of other factors, we have given up trying to be timely about reviews. If you send something to *EMI* for review, you can be pretty sure it will be several months at least before any review appears, and possibly much longer.

SHIPPING AND HANDLING: We have had to start adding a small s&h charge to a few of the items for sale from *Experimental Musical Instruments*. In the past, everything we had available was produced entirely in-house, and we were able to incorporate shipping costs into the prices we set. This system kept things very simple. Now we're selling several books produced in conjunction with other publishers, who have given them cover prices set on

the assumption that shipping costs will be added separately. In the few cases where there will be additional shipping costs, those costs are clearly marked in our ads and on our order forms, so there should be no confusion.

In a nutshell, the shipping arrangement when you order items other than subscriptions from *EMI* is as follows: the price plus any indicated shipping cost indicated for each item covers air mail delivery within North America and surface delivery elsewhere. Overseas air mail is available for an added 25%. See our ads toward the end of this issue's Notices section for more information on the wonderful resources we have available for people interested in exploring the world of musical instruments.

COMMUNICATING WITH EXPERIMENTAL MUSICAL INSTRUMENTS

POST: PO Box 784, Nicasio CA 94946, USA

PHONE/FAX: (415) 662-2182

E-MAIL: ExpMusInst@aol.com

WEB SITE: http://www.windworld.com/emi

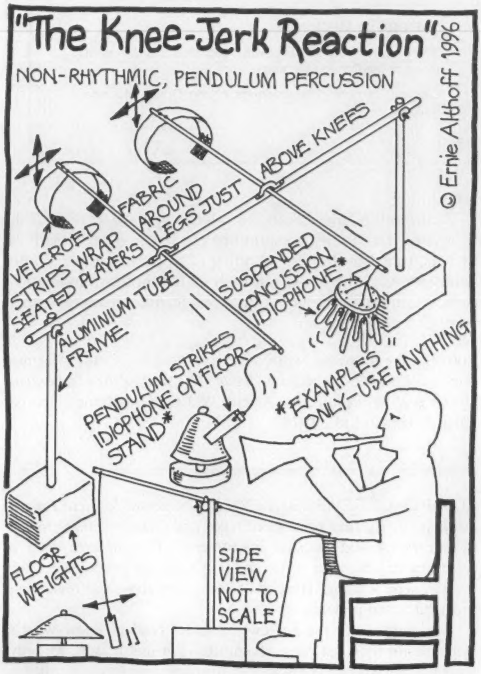
For information on subscriptions, books and other things we have available, see our ads near the end of the Notices section and elsewhere in this issue, or contact us.

CORRECTIONS

In the "Notes from Here and There" section of our last issue we presented information on and photographs of MIDI controllers from Harvey Starr of Starr Labs — keyboard-like and guitar-like player interfaces with unusual, highly versatile, software-configurable layouts. But we failed to give the contact information for anyone interested in reaching Starr Labs. Here it is: Starr Labs, 1717 Fifth Ave., San Diego CA 92101; phone (619) 233-6715; fax (619) 233-1231; website http://www.catalog.com/starlab.

In last issue's article on music from the long transport wires used above the fjords of Norway's North Sea coast, we gave an incomplete e-mail address for the article's author Atle Pakutsch Gundersen. The correct address is: atgunder@sn.no.

In last issue's article "The Art of Sound Effects, Part 2," we gave an e-mail address for author Ray Brunelle which has become outdated. Ray's new e-mail address is Rumble@nh.ultranet.com.



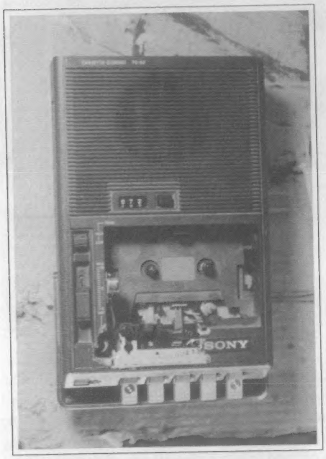
JAMES BORING recently sent along photos and notes on some of his sound objects made from recycled materials. His descriptions:

Photo #1 is of a modified tape player. The play head has been moved over next to the volume control. You can take a ribbon of cassette tape and run it manually on the playback head, which creates an interesting range of sounds based on the amount of tension and speed you use. A delay hold is used to catch sound from the tape player and arrange it rhythmically.

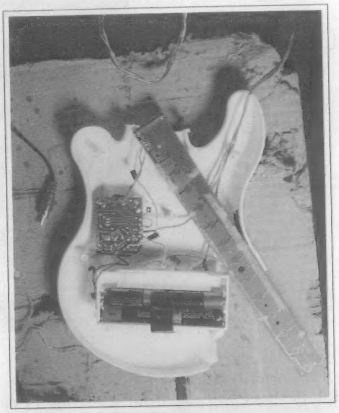
Photo #2 is a toy guitar. I re-did the soldering and added an output. Using your fingers in the circuitry, you get an intense array of sounds far beyond what was intended.

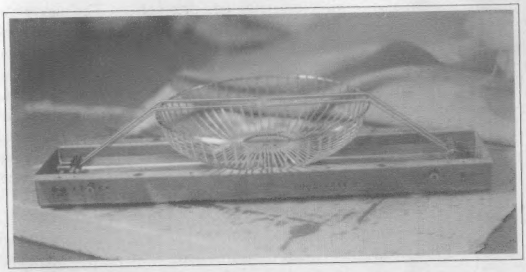
Photo #3 is of a spring reverb with some added stuff. I used this recently to play with an experimental techno group, Not Breathing, when they came into town.

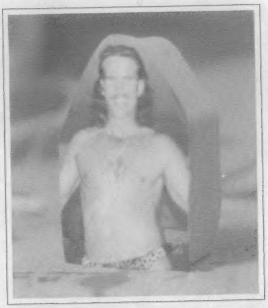
Photo #4 is of "The Perfect Man." It is a box with a miniature record player inside, triggered by a button (a smaller version of a similar device found in other older pull-toys). The photo on it I found at a Goodwill store. The man's mouth is in the same place where the button is, so all you do is press his mouth and he speaks words of love, such as "I need your warmth." My guess is the original toy this came from was a gag gift.



Sound objects from James Boring







MORE DRUMS FOR THE NEW MILLENNIUM

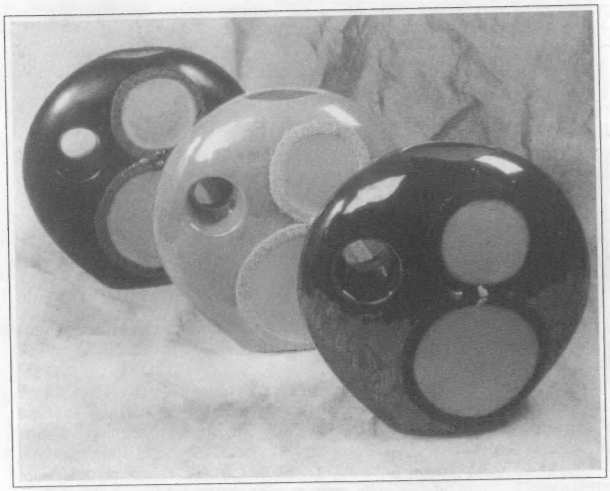
By Ken Lovelett

The photo above is of my recently patented *orthogonal lap drum*. This drum measures about 12"w x 8½" high and sits in the lap with the boat-shaped head (the head facing up in the photo) facing out toward the audience. The round head is facing upward toward the performer. The round hole or "sound portal" towards the left side of the drum can be covered with the hand to varying degrees to create a change in pitch as well as a glissando effect. It can also be hit to create an udu drum effect. The player can also use metal thumb rings to hit the side of the drum, as well as bamboo bushes. The drums are made of clay with calf-skin heads glued to the clay shell. The drums pictured are hand painted by me, but the drums can be made with an assortment of beautiful glazes. There is also a drum that features an even-smaller head or third head located below the sound portal (not pictured). The orthogonal lap drum is light and portable, and its range of pitch is incredible for its size. This drum always attracts a lot of attention at the concerts and seminars that I go to.

Top of page: photo #1,: Orthogonal Lap Drum
Lower left: photo # 2, Thumb Drum

The drum in Photo 2 (left) is my newly patented *thumb drum*. The thumb drum measures about 7" wide x 7" high and is also made of clay with calf-skin heads glued to the drum shell. The performer can insert the thumb through the back side of the hole that passes through the drum and bring the remaining fingers over the "sound portal" at the top. This drum sounds best when hit with the bamboo brush. Note in the photo that the bamboo brush has a rubber-tipped end as well. The performer can put all or none of the fingers over the sound portal to vary the pitch. Quarter-tone steps are also achievable. This drum is especially nice for drumming groups with performers who like to dance while they play.

The drum in the Photo 3 (facing page, top) is my newly patented *belli drum*. These drums are made of clay and measure about 12" wide x 12" high. The belli drum is similar to the thumb drum but is much larger and deeper in tone. The hole going through the drum is for a strap so the performer can stand or dance with the drum. The bottom part of the drum rests on



1) Palm drum. The sound is something like a djembe, but the pitch can be controlled by covering the spout with the palm of the hand.

2) Finger drum. The form is reminiscent of an udu drum, but unlike an udu, the finger drum has a 3½" calf-skin head on top.

3) Knee drum. This one sounds like a high-pitched bongo. It comes in three diameters (the one pictured is 4").

4) Udeck. This drum form is a combination of a dumbeck and an udu drum. The drum can also change pitch.

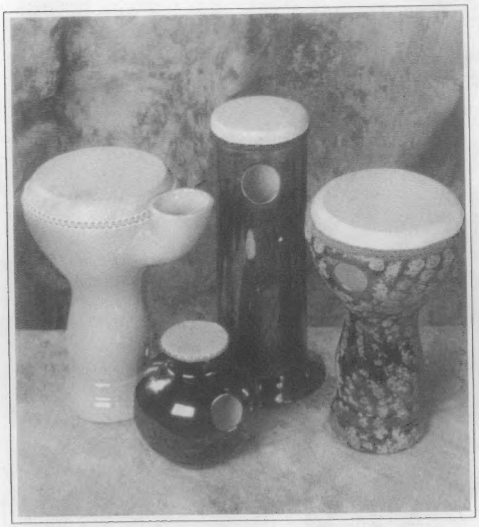
Photo #5 (below right) shows a set of hand-painted or glazed dumbeks, 16" high with 8" heads.

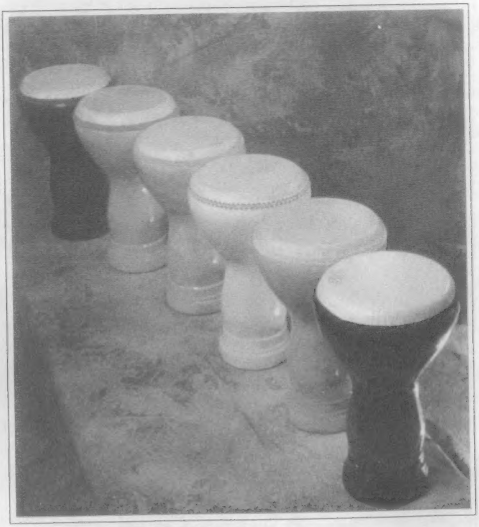
All of these drums are my own creations. Since they are inventions, there is no ethnicity that accompanies them. Therefore any playing technique is still open for experimentation. The playing techniques described here were derived by me in the last year.

the lap while the back part of the drum rests on the belly or stomach area. One can play on two heads at once as well as changing the pitch with the portal at the top of the drum. The drums shown are glazed versions; they also come hand-painted.

The drums in Photo #4 (below left), from left to right, are as follows:

Ken Lovelett's drums are now being marketed through American Percussion Instruments. Ken Lovelett can be reached at A.P.I., P.O. Box 65, Mt. Tremper, NY 12457; phone 914-688-7620; fax 914-688-5299.





Top of page: photo #3, Belli Drum. Lower left: photo #4, Palm Drum, Finger Drum, Knee Drum and Udeck. Lower right: photo #5, Dumbeks.

INDUSTRIAL WASTE AND MUSICAL TASTE

by Keith Spears

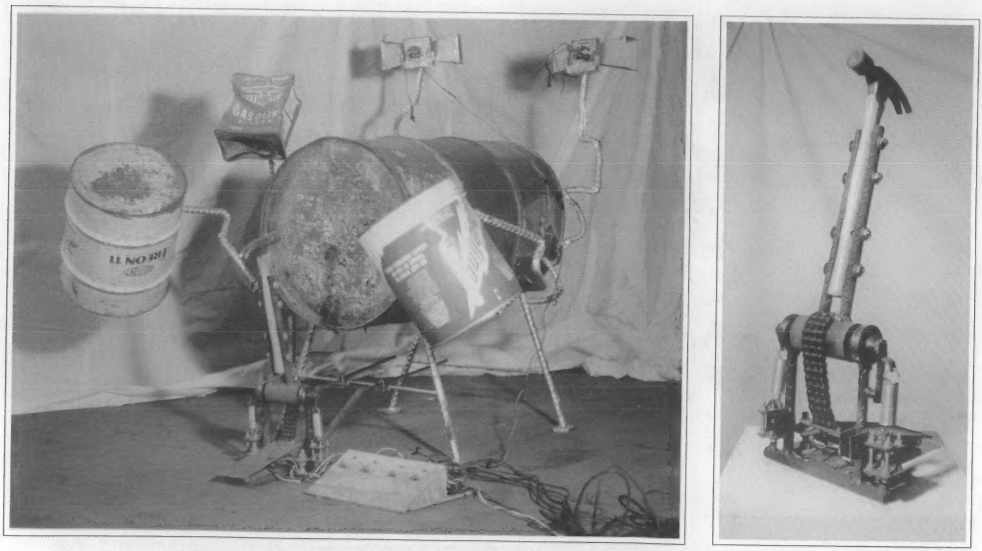
Photographs by Jamie Noe and Keith Spears

Music has always been a large factor in my life. I've played in numerous garage bands and I eventually became a d.j. at an alternative radio station for about five years. But what led me to instrument design was one of my sculpture classes. Someone in the class had erected a drum kit made of washing machine barrels, but had used a regular foot pedal. That's when the idea for an industrial foot pedal hit me, and spawned several other ideas for musical instruments.

When someone goes to a yard sale and happens to find a vase, he or she then ponders what to do with said vase. The same cause-and-effect situation can happen in a junkyard. The junkyard, as dirty and unappealing as it may seem, can also be a fountainhead of both ideas and the building blocks to make those ideas come to life. It offers a diversity of found objects as well as raw building materials such as sheet steel and pipe. Not everyone has a welding unit and cutting torch to modify their junkyard finds, but a little effort with a drill and mechanical fasteners can go a long way too. Unfortunately, access to junkyards is being increasingly denied due to insurance liability. So get it while you can.

Radio Shack is another great place for materials. The best buys I've found have been their selection of switches. They have switches for turning things on, then off, and momentary switches which will leave whatever they're connected to always on until suppressed (normally closed switch), or always off until suppressed (normally open switch). The names of some of these switches may sometimes seem complicated, but the theory of their operation is pretty basic.

Surplus auctions are the last best place I know of for ideas and materials. They are constantly advertised in the classified section of the newspaper, yet they don't pull in a record-breaking crowd. They are better than any mail order catalogue, since the items offered are usually more heavy duty, such as institutional fire alarms compared to pocket-sized piezo buzzers, or motors that



Industrial drumset by Keith Spears. On the right, a detail of the drum pedal.

the postal service wouldn't consider getting a hernia over by delivering to your door. At surplus auctions you can get the same diversity as at a junkyard, but more on an electronic level as opposed to percussive. In the past, I've seen P.A. equipment, record and cassette players, film projectors, and 16 mm films of unquestionable nostalgic value, all by the pallet-load with bidding starting at less than two dollars. Remember, even if the item has inches of dust and grime on it, it may have been the top of its line at its production date.

For the remainder of this article, I'll describe two of the sound instruments that I have made from surplus materials.

THE DRUMSET

The drumset began with the foot pedal. I wanted to have a pedal that looked intimidating, could deliver a powerful kick, and was capable of conveying to-the-beat electronic impulses for controlling other devices. Using a regular store-bought hammer, I built a carriage for it such that the hammer could be replaced if its wooden shaft became split. I drilled holes through the hammer's wooden shaft and secured it to the pedal's metal armature with nuts and bolts. I found a thick drive chain similar to a bicycle chain to use for the pedal's momentum. Two large discarded sealed bearings were placed on either side of the carriage for the pedal's pivot point. A large barnyard door hinge served for the understructure of the foot rest. I added a heavy spring to the side of the pedal, providing tension when the foot presses down on the pedal to propel the hammer forward, and causing the hammer to spring back when the drummer's foot is lifted. One end of the spring's attachment is stationary, attached to the sealed bearing at the pedal's pivot point. The other end is secured to an adjustable platform, so that tightening this platform down adds tension to the spring. This allows for a harder striking force and faster recoil of the hammer. But one spring wasn't powerful enough, so I added a second spring on the other side of the pedal.

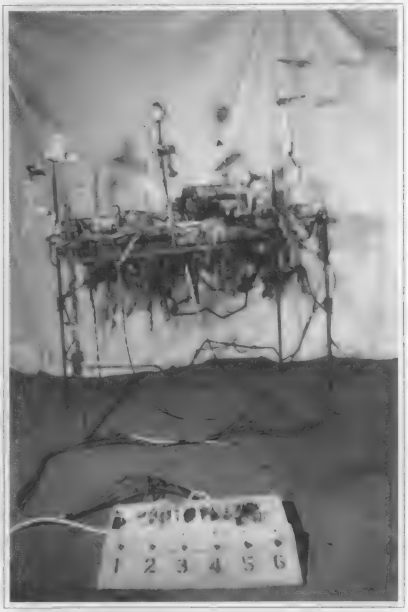
My musical performances are usually enhanced by a good visual accompaniment. A lot of work and proceeds from shows goes into making the concerts into multi-media events, with the use of video, film, and light projections. The kinetic engineering behind the multi-media make it seem as if everything is in tune. The rotating lights and projected images appear to be in sync with the beat of the music. To make multi-media performance work for me, I took the approach of installing some momentary switches from Radio Shack under the foot pedal. The switches control external stimuli such as video, film, slide projectors or whatever I want to hook up.

When the pedal is pressed down, the switch contacts are either made or broken, all to the beat of the drum. I installed four switches on a rectangular platform. The switch platform was then mounted under the foot rest on a large bolt on either side of the pedal. Being mounted on this bolt, the platform can be raised or lowered to ensure fine tuning between the foot pedal's contact with these switches, and when the hammer flushly strikes the drum head.

Next to the foot pedal, I also have what I call my "kill box." It's a set of on/off switches to override the ones under the pedal. The kill box switches turn the pedal's momentary switches off or on, to vary the external electronic stimuli from composition to composition.

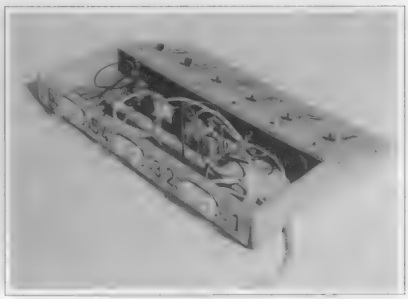
After the foot pedal came the drum set. I designed a carriage out of "rebar" steel structural rod, and a couple of thin metal strips. The rod was bent by hot coals and welded together to form the understructure, with extensions to support many percussive elements. The metal strips had holes drilled in them for a secure, yet semi-flexible attachment for a 55-gallon drum. The strips were then welded onto the rebar understructure and the 55-gallon drum bolted into place. Also welded onto the rebar extensions were thin metal strips with holes to support other percussive elements such as empty gas and freon containers. The rebar and steel were also shaped to house some heavy-duty fire alarms at the front of the set. The structure can be easily disassembled for travel as well as for replacement of damaged parts. A 55-gallon drum can be quite bulky to transport, but such drums aren't too hard to find anywhere on the planet.

The audio quality of the set needs help when paired off against other instruments' amplifiers. Drum sets are usually amplified anyway at club performances. But with electrical elements already designed into the set, adding drum triggers with hard percussive sounds built in could be an option that would blend in with the overall image.



Above: the Sampler Table, by Keith Spears.

Below: Detail of the Sampler Table's foot control.



THE SAMPLER TABLE

I made the sampler table to provide quick on-site sampling during live performances.* It takes the sampling usually done in the studio or at a mixing board in performance, and puts it in the hands of the performers. It consists of cassette and record players with an independent power source.

The power buttons on all of the cassette and record players are left "on," and the "play" buttons are left suppressed. The power chords that go into each player have been spliced and a push button switch installed. When the newly installed push button switch is pushed, then the power can flow from the wall outlet through the switch, reaching the players which then deliver the audio sample.

The cassette players use endless tape loops like those found in answering machines. This can provide a repetitive sample with more accurate cueing than a regular tape. To record an endless cassette loop of say, an ambient or noisy sample, a four-track tape works best. When recording, there is going to be an audible gap between the start-time and end-time of the recording. On a four-track, you can record on track one beginning at "0" on the tape's cycle counter and end at "59" for a 60 second tape. Then begin recording track two at "15" and end at "74," also 59 seconds later. A regular cassette player will play back tracks one and two simultaneously, and the recording gap will almost be inaudible.

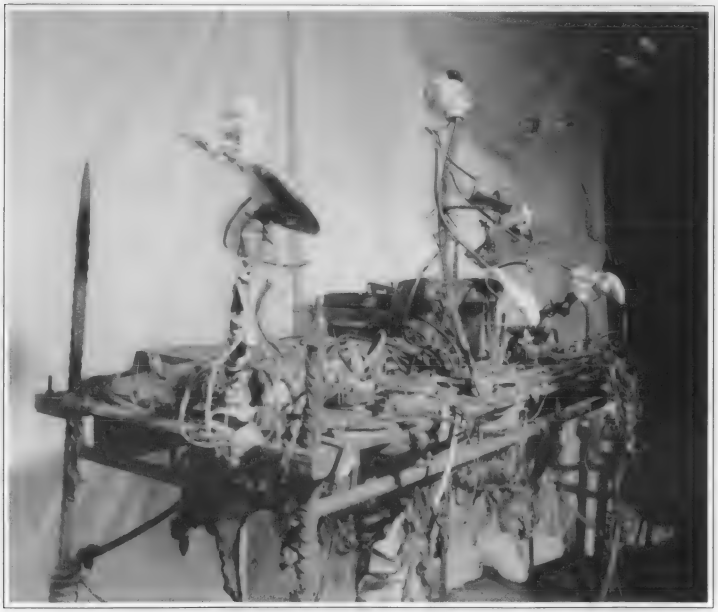
I use mostly nostalgic records on the record player. My favorites are the Herb Alpert recordings, and I am also always on the lookout for the "How to..." records such as "How to Type" and "How to Transcribe and Dictate."

The sound from the players is patched by means of ¼-inch guitar chords running from the players' outputs to a patchboard terminal, which then has a single output chord running into a P.A. system or guitar amp.

To illustrate which cassette or record player is delivering the sample, I've added a nostalgic motorized scene in front of each, which goes into action whenever its particular player is activated. Some players have country-club figurines captured in the spotlight atop their rotating sawblade vehicles, while others have rotating 50-caliber machine gun bullets guided by chrome angels or a distorted clown with a motor for a chest shaking him into action. Unfortunately, the motors do produce some electro-magnetic interference in the amplifier. But it's not too bothersome or always unwanted.

In conclusion, I'm very happy that a friend turned me onto *EMI* since it doesn't appear in any bookstore in Kentucky that I know of. *EMI* gives credence to the musician as artist. Unfortunately, not many musicians/artists are in complete control of their work mainly due to the legal and marketing constraints of their record companies. However, with "indie" rock/d.i.y. bands appealing to a greater mass of consumers, and with the exposure of the scandalous packages of "musicians" who lipsink in concert and don't even sing at all on the albums that carry their names, the artistic restraints of musicians on contract will continue to loosen.

Keith Spears works as an injection molding technician at a Brown-Forman plant (making liqueur-bottle caps) during the day, and operates a sculpture studio at night in downtown Louisville. He can be contacted at: P.O. Box 6791 Louisville, Ky. 40206-0791.



*Sampling = recording short segments, or *samples*, of different sorts of sounds, so that they can be manipulated and played back (sometimes in altered form) for musical or other purposes.

COLIN OFFORD: MOUTH BOWS, MOONBELLS AND MORE

An Interview with Warren Burt

Colin Offord is a composer, performer, visual artist and musical instrument inventor. He has invented or developed a number of instruments, including the *Great Island Mouthbow*, the *Xylopt* (a bailer-shell xylophone), the *Moonbells* (large aluminum and brass bells), the *Australasian flute* (a Western flute with a bamboo mouthpiece), and the *Bambudat* (a set of large bamboo log drums). He has also made a variety of flutes, such as the *Windpipes* and the *Wedge-Tailed Eagle Feather Flute*, which he uses in both solo performances and with his group, the Great Bowing Company. Here he talks to *EMI* contributor Warren Burt about the origins and uses of his instruments.

Warren Burt: Let's start with the mouthbow. How did you develop that?

Colin Offord: In 1980, a very good musical instrument maker and inventor named Terry Hennessy heard me playing a simple mouthbow in a concert. It was a branch with a guitar string on it, played in the conventional way. After the concert he said, "I've got something that might interest you. Come 'round." When I went round there, he showed me an old gramophone needle on a hard bit of wood, with a string over the top of it, and a tuning peg in it. You could play it like a mouthbow. He'd replaced the funnel of the gramophone with a tube which went into his mouth so that you could select harmonics. It was a very hard, brittle sound, very driving, snarling, but it had plenty of kick and a lot more volume than mine. And he gave me a diaphragm to take home. I lived with it for a few months, until I hit on the idea to build the first *Leichhardt Gramophone Mouthbow*, about 1981. At that stage I only played acoustically, so I used to play it in little gallery settings, in intimate concerts, and so forth. It worked just fine, but the way I constructed mine, it was also a sculpture. I also used a much deeper pitched string. I took it back to Terry and he was very impressed; he felt I'd taken the idea somewhere.

Colin Offord's Great Bowing Company

That, I felt, gave me the license to take an initial idea from somebody, and run with it, and develop it, and make it my own.

By 1982, I developed from that a diaphragm device that I could use on any stick and string. It had a little tube and a mouthpiece. In fact I still use one of those when I play the earth harp [recorded on his previous album, *Pacific Sound* Move Records MD3105, reviewed in *EMI*, Vol IX , No. 2, Dec. '93].

I went to Germany to do a residency at Iwalewa Haus, an institute for third-world modern arts in Bayreuth, run by Ulli Beier, and there I built the *Grand Bavarian Mouthbow*. I was building these and calling them after the place I was in, with essentially that principle. When I came back to Australia in 1982, I premiered the *Grand Jacaranda Mouthbow*, still using the gramophone diaphragm principle. This version was a substantial development of the instrument — it was deeper; it was taller. The first one was almost three meters high. It even had a little lantern hanging off the top, so it had its own direction-finding light. I premiered it at the [Sydney] City Art Institute in 1982, and that's where it really began for me. I played that for some years, developing all the basic techniques, and started exploring other possibilities of making my own diaphragms. Gramophone diaphragms were limited in size and tone.

Then in 1986, I spent six months designing my own diaphragms, bridges and mouthpieces, and came up with the first. At that time I also developed the first *Moonbells*, and the first big *Windpipes*. The rest is history, because every few years I've had to make a new *Great Island Mouthbow*, to try and make it better. There have been about four stages along the way, and there's a new one under way at the moment.

Colin Offord and the Great Island Mouthbow

WB: Your current resonator system is that you've got a number of long piano strings, and they're going over a metal bridge, and the metal bridge is connected to two carbon fiber discs which are in wooden cups. There are pipes coming out of the back of the wooden cups, which connect to a central pipe, which goes into your mouth.

CO: Yes, that's right. The reason it works is because I've put a lot of time into finding the marriage of the different materials. If the wood for the resonators is too soft, or too hard, you don't get a good tonal range. The diaphragms themselves are very important. I've found carbon fiber to be superior to absolutely anything else. Some plastics have been interesting, like laminex, for instance, though it's a bit thick and heavy. But carbon fiber is superb. I've tried all kinds of metals for the bridge, and the only one I've found satisfactory is structural aluminum. Wood would be interesting, but it just won't take the pressure. I make the bridges, and the diaphragms — I make everything myself.

The wood for the support of the instrument — I've chosen paperbark tree for a number of reasons. It's really strong, long grain and sinewy, has a very interesting shape, and a beautiful color. The visual thing became very important, and I can always find something that's been bulldozed down, or broken off, or whatever. I never try to stress the timber in any particular direction it doesn't want to go. Paperbark is a very sinewy timber, it grows very slowly, and it likes to be near a water source, like near the banks of a river. So it takes a long time to dry; it holds a lot of water. The bark itself is extremely thick. You might get a tree that's half a meter across, and when you strip the bark off, it's only about 200 mm. Usually, I go for a branch that doesn't need to be pared down much, just to be cleaned up. I don't try to change the shape too much — I work with the given shape, I find something that works for me. With the new bow, I'll be splicing a few sections together for the first time since the original bow, which was built in two sections. The new bow will be made spliced from three sections into one solid, designed so that when it's in its case, it fits into the back seat of a taxi.

But it's the marriage of the materials, and the weights, that's really tricky to get right. I use bridge posts of brass, to hold the stress of the bridge, and to transfer the vibrations into the timber itself. Everything hums; everything is designed to sing off everything else. I'm going for maximum sustain, and maximum overtones. I have the strings made up to my specifications, by Lou Parke of Parke Piano Strings, Australia's only piano string maker. He makes my strings just the way I like them.

WB: How do you tune the strings of the mouthbow?

CO: The present bow has five strings, and the bridge is curved. Everybody always asks me how do you have to tune it, which always amuses me, since when you invent an instrument, you can tune it any way you want. [Laughter] But I tend to tune it in flat keys, because I like singing in flat keys more than sharp keys. I tend to tune it to A440 equal temperament, with an electronic tuner, but then I tend to correct some of the intervals to my ear. Sometimes I might do something like tune it to two Ds, one slightly flat, and one slightly sharp, so you get that shimmering, so you don't quite get a minor ninth, and you don't get an octave either. I usually go for tunings that give me a great range of intervals, so I might end up with a semitone, both minor and major thirds, a fourth or a fifth, and minor sixth, or whatever. Sometimes, like I said, a minor 9th, etc.

Naomi Vaughn plays Moonbells

wood gives me that extra thing. There's a brass post going through the wooden bridge that holds the bell on. So again, the bell is working to reinforce subharmonics, and so on.

WB: And then, there's feathers on it.

CO: [Laughing] Yeah, the feathers have been on every Great Island Mouthbow since I started. On two of them, including the current one, I tried to get rid of the feathers, and it just looked too naked without them. The new one that I'm working on now originally wasn't going to have them, but it will. So I've made up my mind that I'll do the feathers in a totally different way, but I don't know how yet.

WB: You then play the mouthbow not only with a bow that you've made yourself, but also with chopsticks wrapped in cotton string and glued into place.

CO: I can use the chopsticks as a scraping device. The string adds weight to the sticks. Particularly since I use two sticks, held in the hand similar to the way you eat with chopsticks, it allows me to move both sticks independently. I also pluck it with my fingers, and I'm just getting into using fingerpicks as well — just a little bit.

WB: And then you also have a little radio mic that picks up all the resonance that's coming out of your mouth, and the instrument.

CO: The instrument's deliberately designed to be very soft. The resonators are different sizes. It's very very critical, the proportion of the resonators, and I've found that out by trial and error. The small one gives the higher frequencies, the bigger the lower, although both have got a good frequency range. But if I made them very large, like

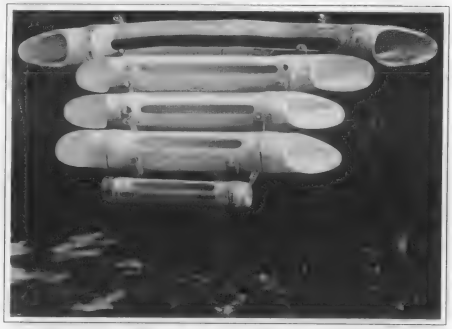
And by just bowing and working from different positions, I can then get a lot of different scales to sing off. I find I tend to tune it fairly conventionally, into pentatonics, or something like that, because I can get a lot of the other "dirty" sounds off all the other parts of the instrument. And I can bend it, and change things so much with the mouth harmonics, that I can distort the sound as far as I want. But in tuning, I tend to go for strong tonal centers, and I guess that's the Celtic part, or the Chinese part, of my musical nature. [In Offord's most recent score, for William Yang's theater piece *The North*, the mouthbow is tuned C#$_3$ (mid bass clef) F#$_3$ A$_3$ B$_3$ E$_4$.]

WB: On the mouthbow there are also several percussion items. There's a guiro-like set of ridges near the bottom of it, and there's a bell and a cymbal.

CO: The guiro section is simply carved into the timber itself, so it works as a visual element as well as an aural one. There's a little fork that I've flattened with a hammer, so it's splayed, almost like some kind of mystical sign, and that's used as a kind of muffly kalimba sound. There are also two little brass wheels that can be spun. They also rattle, and start to buzz on certain frequencies — I can dampen that down, if I want. It's got a couple of springs on it, small automotive springs which give a lot of subharmonics, and all of that is transferred into the bridge. I also play the strings above the bridge as well. There are two bells — a Chinese cymbal and a little Nepalese bowl. At various times, I've made bells for the mouthbows, but these bells have ended up on this bow for fairly arbitrary reasons. The bottom bell actually works as an additional resonator. There's a post running through from the bottom bridge, which is made of timber. It's interesting, the strings are bridged at one end by a wooden bridge, and at the other end by aluminum. When they were bridged at both ends by metal, I didn't like the sound. It was just too brittle, but the

Aku Kodoga wearing "Detritus"

Below left: Colin Offord with the Australasian Flute. Right: Bambudat, or bamboo log drums



a Dobro guitar, all the sound would come roaring off the front of the instrument, with not enough going back through the tube, into my mouth. This is where it gets very important to get the sound as loud as possible acoustically, but to have it driving back through the tube. I want as much sound going into my mouth as possible. Then I just use a little lavalliere radio microphone. I'm using a Sony capsule, because the Sony mic has a very natural sound, it's not colored, like other lavalliere mics are.

WB: The Australasian flute is a Western flute body with a bamboo head. You made the bamboo head to the precise dimensions of the Western flute mouthpiece so that intonation stays the same.

CO: Well, I actually had the reaming done for me by Ray Holiday of Flute Makers of Australia. We drilled the hole for the embouchure hole, and he made a lip plate, and I wouldn't even let him put it on. I didn't want a lip plate. So we carved the embouchure hole with a dental drill, and then I rolled up sandpaper and just kept filing with very fine sandpaper until I liked the sound. It enables me to bend almost a full tone or more with head movement. It also has a second hole which is covered with a thin bamboo paper membrane, in the manner of a Chinese flute, or a Thai flute or a Chiapas marimba. The only reason I did it was that I found the flute too clean, too precise, too pretty a sound for the music I wanted to play. With the bamboo, I can get a clean sound, or I can get a reedy, plaintive sound — a darker color, or I can get a soft woody sound of the Celtic flute as well. It gives me a bit more tonal range to work with, a bit more pitch bend.

WB: The Moonbells are thick slabs of aluminum and that you've cut with a bandsaw.

CO: Yes. The density of the aluminum's important. If it's soft aluminum, it'll be a bit woofy in the lower mids and bass frequencies and just doesn't have any real ring in the upper highs — the upper highs are very brittle and transparent. Structural aluminum has a very rich sound, it has a lot of sustain. If I want the bells to be dominated by the higher frequencies, then I go for a much thicker plate, around 15-16 mm. If I want the lower bell, then I go for 10 mm. And for portability's sake, I don't have too many of the thick ones. The Moonbells break down, including the stands, into four bags, so they can travel as excess baggage on the plane with me. Everything I make is designed to fit into outsize cases that can be checked in at the airport, so that I can tour. One of the reasons that I invented the mouthbow was because at that time [the early 80s], I was using whole environmental settings. Coming into music from a sculptural base, I would spend 2 to 3 days setting up an environment to perform in. And I got sick of it. You couldn't do one-off gigs. And I wanted to have an instrument with a vast array of sounds at my fingertips, that also reflected a lot of the sounds of instruments that inspired me, natural sounds, and so on.

WB: And then you have the Windpipes, which you also call Harmonic Flutes. The harmonics of the mouthbow, harmonic singing, harmonic flutes —

CO: [Laughing] Yeah, well they are the building blocks of music, anyway, and, I don't know, there's something very beautiful about working with something very simple.

WB: Windpipes, or Harmonic Flutes, are just long tubes with flute mouthpieces cut in them.

CO: Some of them are quite short, as well. I've got little ones that are about 8 inches long, but the longer they are, the more interesting the harmonics get.

WB: How long is the longest one?

CO: The longest one I've ever made was actually about five meters; it was built from scaffolding. But it was a bit self defeating — all you could do was blow it, you couldn't do anything with your hands, and there had to be something more practical than that. The longest one I'm using at the moment is about 1.8 meters.

WB: These are just tubes with open ends, and you use your hands on the open ends to seal the ends, and change pitches and so on.

CO: Sealing and subtle hand movements, putting your fingers into the end. Embouchure changes, moving the head in and out to change pitch as you do on any cross blown flute, and so on, overblowing, and a combination of all those things, yeah. The bore size on the larger flutes is anything from 35 — 50 mm, the largest is about 70 mm, which is nice in the bass register, but not very effective in the top. Some of the short ones, about 500 mm long, with a hole very prejudiced to one end are very nice to play in the wide bore, but you can only play short phrases. Because there's no back pressure, the air disappears very quickly. But they have a lovely sound, they're reminiscent of Kuakumba flutes

played by the Chimbu people in Papua New Guinea highlands. Also up in the Sepik River region of New Guinea, they have a very powerful tradition of sacred bamboo flutes. I built these most recent ones out of structural aluminum, and then I had them anodized so they'd look pretty, and also because I don't like having aluminum in my mouth, and the anodizing seals that. But also, it seems to take a bit of the sting out of it, as well. Up around 8 to 13 kilohertz, there's an edge that's really quite brittle, and it just mellows that out a little bit. I've made a lot of windpipes out of bamboo as well. I tend to work much smaller in the bamboo, and make flutes with fingerholes as well, because I live in the Blue Mountains, and it's so cold. It can be very dry sometimes, and then very, very wet, and suddenly very dry again and very cold, and the bamboo just goes nuts. It's just the wrong climate for bamboo, so I haven't pursued the bamboo much, though I've built some smaller bamboo flutes, called left flutes, or lyrebird flutes, which are designed for my left hand. They have four or five fingerholes, and a blowing hole, and a hole for a membrane, and they're sealed at both ends. As soon as you seal a flute pipe, it drops an octave. So they can't be overblown very well at all, but they have a beautiful lyrical sound, and I can do microtonal shadings with them. I use those while I'm playing the mouthbow, so I can bow the bow, and alternate between the flute, and the mouthbow mouthpiece, and singing.

WB: Describe your *Bambudat*, or bamboo log drums.

CO: There are five of them, and the largest one [at the top of the photograph] is about 1.6 meters wide. The bamboo itself is about 200 mm round. To tune my bamboo log drums I cut a slot, and then at the approximate distance of the width of the slot, I cut a second slot, but a very very narrow one, so in effect creating a log drum with a long tongue held at both ends, and what that gives you is a kind of stringy note, a very wooden sharp note, and also the fundamental pitch of the log, so you get three very distinctly different notes from it. That set I built for James Pattugalan who's a member of my group, who's a wonderful percussionist. I had a simple log drum, and when I saw him play that, I was so excited I went away and developed the current instrument for him.

It's interesting, that since I've been developing the ensemble, The Great Bowing Company, there are instruments I've been developing for specific people's skills. The last reworking of the Moon Bells was for Naomi Vaughan, who had decided to seriously dedicate herself to playing those bells. The only person I ever liked playing the bells was myself. I found that most percussionists played them too often, and in too rhythmic a fashion, and moved very poorly around them. It's such a big sculptural instrument, it really requires you to do a slow motion dance to play it. Percussionists just weren't slow enough. And if dancers used them, they would mis-hit, and they weren't really hearing the harmonics, and putting the sounds together well. Then Naomi turned up, who's a keyboard player, a physical actress who's done a lot of movement work, and a percussionist. So I don't even like my own playing on it anymore. It's a complex instrument, and Naomi has a number of pieces, and she can improvise all day on them. Mixed in with the Moons is a log drum, some seed pod rattles, some high pitched bells made from the brass pressure brass in water pumps, some disk bells and so on. Naomi was getting into them so much that I decided I wanted to really develop the instrument, make it portable, and take it the next step. I thought I'd finished them, but now I feel that after I finish the new mouthbow, I need to spend another year on the Moon Bells. Every time I think I've got it, something new turns up for me.

Colin Offord with Bass Conch Shell

WB: How many people are in the Great Bowing Company?

CO: Usually we perform as a five- or six-piece ensemble. There's a pool of nine people who work on a fairly regular basis with the group, and it depends on the nature of the project and what we're doing, who would be on call. There are a few dancers too who work with instruments that require movement to bring them to life.

WB: In the ensemble, you also include traditional instruments, like saxophone, percussion and didjeridu.

CO: Yes, there are two didjeridu players, Les Saxby and Matthew Doyle, both aboriginal players from different traditions. They play in very different styles. A lot of people don't realize, because we hear so many white players, who play OK, but who just kind of do their own thing a bit, just how many traditional styles and approaches there are to didjeridu playing. So both these guys have distinctively different styles. They also sing, particularly Matthew, who has a wonderful voice. He sings in the Tharwal Aboriginal language with me singing in English, or using vocal sounds. Peter Boyd plays baritone and bass saxophone, although with the Bowing Company he mostly plays the baritone. He's like a musical chameleon. He can make the baritone sound like the mouthbow, or the moonbells. He can play great slap-tongue, so he can sound like the hand drums. He's a very imaginative sax player, and whilst he's studied some jazz, and classical composition, and popular musics, he doesn't play in any of those styles. He really has a very unique voice. I found that most saxophonists played too much within a characteristic mode, and that doesn't actually work for my music so well.

There are also two percussionists, both of whom specialize on some of my instruments. Peter Kennard plays the *Xylopt*, a very natural instrument made from whole bailer shells, the largest being about 500 mm across; big shells down to tiny ones. They rest on black acoustic foam blocks, and they're played with very soft mallets. I describe the instrument as sounding like a microtonal xylophone played under water. It's a beautiful, lyrical, spellbinding sound, and I don't make any attempt whatever to change them from their natural tuning, except that over a number of years, every now and again they'll get chipped on tour. As much as you look after

them, that happens. When the chipping causes them to lose the tone, I just give them a bit of a sand, along the edges, and that changes the scale, much to the chagrin of some of the other players. It doesn't bother me, it's just life. I figure it's just an ever upward scale, over a long period of time.

Peter also plays an instrument called the *Link Gongs*, built from hubcaps, stainless steel pots, spoons with the handles cut off, etc. It's a very metallic, jangly gong-like instrument, which served as a link between the wooden sounds and the strings, and the winds. Peter also plays some West African drums and German frame drums. James, in addition to the bamboo log drums, also plays traditional drum kit. Peter also plays a bass drum that he made from a 44 gallon drum, with big hairy skins on it. It's a contra-bass drum. We also use it as a kick drum.

Aku Kodoga and Naomi Vaughn do dances with two of my instruments called spoon bells, which are a series of the discs of spoons, strung on strings, and they do dance movement, using them as whips around their body, turning them very slowly — it's like a slow-motion bell ballet, and the handles are made of bamboo, so you can actually use them as woodblocks as well. The other instrument I've made is the *Raindrum*, which is a double-sided hoop drum with seeds inside. It's about 800 mm across, and a couple of inches deep. And then the dancers' bodies are hung with *Detritus*. The more dance-like instruments require someone who's very sensitive to sound, who can work with sound, and dance. Give them to a musician, they become rather mediocre instruments. Give them to a dancer, they become exciting. The Detritus costume has turned more into a visual, sculptural thing these days, with articulated sounds. At first it was literally the body just smothered in jangly noisy stuff. We've gone through that stage now to something a bit more elegant, and lighter. Although I dare say that the big roar will reappear at some apocalyptic point in time.

WB: And you have some flutes made of feathers.

CO: Yes, in 1987, I was given the left wing feather of an Australian Wedge-Tailed Eagle. I kept it for many months, thinking that it was just so beautiful, that I didn't want to use it just as decoration. And when I wasn't watching, as it were, the thought arrived in my mind that it should sing like a bird. So I dragged out all the dry stringy stuff inside the quill, cut it with a scalpel, and made it into a flute. Then about a year ago, I met a man who worked as a keeper at the Sydney Zoo, who gave me a right wing feather of the Wedge-Tailed Eagle. The beauty of the feathers as a flute is that they can play up to three notes at once in certain places, you can split tones almost anywhere on them, and I can get them to pop so fast that it sounds like two or three flutes. It's incredibly high, without having to go into harmonics, because the bore is so small, and the material is soft enough so that it's not a harsh sound; it's a very penetrating high sound, but it's not harsh at all. It's a very difficult instrument to play because it's so narrow. It's as narrow as the little finger on an average small hand.

Colin Offord can be reached at Spiral Sound, PO Box 279, Katoomba 2780 N.S.W., Australia; phone 047 841439; fax 047 842552. CDs are available by mail order from the same address. Management: Natalie Newton.

The following is a pair of articles from Chris Rice and Ian Nagoski, editors for the music and cultural journal *halana*. Their subject is Harry Bertoia (1915 - 1978), a celebrated sculptor and the creator of the *Sonambient*® series of metallic sound sculptures. Chris' article focuses on the sounding sculptures themselves and the context in which they were made. Ian's piece discusses the unique series of LP recordings that Bertoia left, still available through Bertoia Studios and other sources. The articles arise from Chris and Ian's visit to the Bertoia Studios during the summer of 1995, during which they met with Harry Bertoia's widow Brigitta and son Val, and were treated to an impromptu concert on the instruments.

These articles first appeared in *halana* #1, winter 1995-1996; *halana* can be reached at PO Box 502, Ardmore, PA 19003-0502; e-mail HalanaZine@aol.com.

BERTOIA

by Chris Rice

Harry Bertoia was a man of two worlds. Starting in the '50s and culminating in the mid '70s, he attained a great deal of renown as a sculptor, specifically through commissions for large works to adorn the courtyards and entranceways of large business centers in big cities like Chicago, New York and Philadelphia. At the same time as this mainstream, corporate acceptance was growing, Harry was developing a very personal world of his own, a world centered around the barn behind his house in Barto, PA and populated with seemingly infinite numbers of sound sculptures of his own invention. This latter Bertoia is also known in record collector circles as the man who released 11 records on his *Sonambient*® label — all recordings of his own amazing, dreamlike music, recorded in his barn and performed by Harry and his brother Oreste on Harry's fleet of 'sounding sculptures.'

The Barn

Harry's barn still stands today, eerily in the same condition as he left it at the time of his death in November of 1978, and is still frequented by Harry's wife Brigitta and son Val, who is now a sculptor in his own right. Val has taken up where his father left off, continuing to develop and refine Harry's ideas, while adding his own concepts and concerns. In the name of this continuation, Val prefers to use the names *Sonambient*® and Bertoia whenever possible, the intention being to keep his father's (now his) legacy alive. The terms can serve to refer to any Bertoia (which may someday include Val's daughter, Kyndi) or simply one who is working within the *Sonambient*® oeuvre.

Ian Nagoski and I had the pleasure of spending an afternoon with Val this summer, experiencing both his and his father's work directly. We were even given the distinct honor of witnessing a performance by Val and his mother in Harry's barn, a magical place just out of time with the rest of the world.

It all started in the 1970s when Harry purchased a bunch of Navy surplus beryllium-copper wires for use in his sculpting. In the process of working with these rods, a few happened to knock against one another, producing a resonant and long-lasting sound. Harry was impressed by this otherwise common event, the sound propelling him toward the discovery of a new way of hearing and producing sound. He gradually became more and more involved in this new world, creating endless numbers of sound sculptures. Some of these were made for the world at large, in response to commissions or put on display at various exhibits, but a good many he kept.

As his renovated barn filled with these sounding pieces, Harry began to make recordings of himself and his brother Oreste performing on the sculptures. These recordings led to the 11 releases on Harry's *Sonambient*® label, each made up of two sidelong excursions into Harry's rapidly developing sound environment.

The instruments themselves are predominantly three-to-eight-foot-high groupings of metal rods anchored to heavy base plates, yet free to sway and bend when motivated. And just as their height varies, so does their gauge, producing a full array of tonal and timbral qualities, ranging from the deep growl of the tall, thick

pieces to the higher-pitched swoosh of the short, thin rods.

These sculptures are roughly equivalent to wind chimes, though much heavier and richer in both tone and form. Most are designed to perpetuate their own continual motion; a slight nudge can keep a sculpture moving for some time. It begins with an intense flurry of sound and movement, an explosion of activity that serves to continually motivate its concordant dance until the energy begins to subside, with the sound doing the same, gradually fading away.

Rounding out the orchestra are Harry's 'Swinging Bars' (also the name of one side of *Sonambient*® release 1030) and his own unique gongs. The 'Swinging Bars' consist of two suspended lengths of rod. Once urged on, they perpetually rotate on their own irregular paths, occasionally hitting one another, producing glorious tones and further propelling their flight.

The gongs come in a number of designs, each beautifully hand-crafted, colored and textured by Harry's own metal working techniques. A few stick to the standard circular design, while the others seem to be uniquely his. Though their finished sizes vary greatly, the basic design consists of two sheets of metal warped and welded to form an enclosed cavity that serves to greatly amplify and resonate the sounds that come from the metal itself. The result is comparable to the tremendous rumble of thunder, treated with a slew of reverberatory and delay-inspiring effects.

Harry's collection of instrumental sculptures create a wholly unique and mesmerizing array of sounds and voices. This bastardized gamelan, when at the hands of its creator, rivals any music that is at its base concerned with the ability of sound to describe.

Harry Bertoia's *Sonambient*® concept of music is an ideology that is more about what echoes of thought and sentiment it engenders in the listener than what its creator is trying to say. In short, a music that transcends its conceptual base, raising itself and its listener to a higher plane where sound is taken for what it is, and what it can do, rather than what it 'sounds' like.

INSIDE HARRY'S BARN. Note the Swinging Bars hanging from the ceiling, and the portion of a gong in to the left.

SWIFT SOUNDS: HARRY BERTOIA'S *SONAMBIENT* LPs

by Ian Nagoski

Harry Bertoia's creativity is intertwined with a wonderful experience of life. By combining the twin energies, "art" and "nature," Bertoia reminds us of the continuity between ourselves and the world around us. He imbued objects with a vitality which served to parallel his own craftsmanship to the creativity of the woods and hills which surround his home. This vitality is the compelling core of Harry Bertoia's work. The life which courses through it are the sounds which rumble and rustle out of the earth.

The *Sonambient*® barn in Barto, Pennsylvania, where Harry recorded his eleven LPs, now houses dozens of reel-to-reel tapes of his improvisations and the hundred-and-some sounding sculptures which were used on the records. I would love to know more about the circumstances of the recordings: Were they recorded in the order of their catalog number? Harry's brother Oreste plays the sculptures with Harry on some of the records; which ones and why? What made Harry want to release them? And on and on. But I don't think knowing is as important as attentiveness to the finished product.

I don't approach the records cold. Having seen the instruments (for lack of a better word) in use during a mini-recital given by Harry's son Val and widow Brigitta, I do have a visual sense of Harry's work. Val really hit the nail on the head with one observation; he said Harry had a gift for making the sculptures look like they sound. The degree to which the forms and the sounds are inexorably married is really amazing. By strumming a rectangular cluster of vertical metal-rods, they sway. Positive and negative spaces shift, open, close, and recombine; what you thought was a shadow turns out to be a reflection. Now, imagine a cluster of interrelated frequencies of sound doing the same thing the light does. The sounds are an extension of Harry's sculptural way of defining space. The inclusion of sound into the sculptural forms physically connects the observer to the piece in both sound and light, complicating questions of relationship between viewer and object.

The movement of the sound forms relates to the motion of the physical forms, too. A composite impression of the flow of the sounds, one to the next, is like a waterbed in a dream. The sculptures move in that same hypnotic, slow motion. The whole sense of time has sacredness built into it, which I can compare to the flow of the David Hykes or recent Pauline Oliveros stuff I've heard, though without the suspended-in-liquid feeling. It's closer to the sacredness of walking in the woods on a cold night, the crisp, clear awakeness of the unfolding moment. It also includes a few moments that are overwhelming and just too intense, but that's rare.

The instruments aren't tuned as such, because there really isn't a fundamental pitch to tune. Instead the sounds are comprised of complexes of frequencies, which mirror sounds that the earth makes — wind, rain, rivers, waterfall, falling trees. Timbre, sound-color or -shape, is the primary province of earthy sounds. Being made of metals, the sculptures are essentially transformed chunks of earth. The record that Val refers to as the *Original Sonambient* is the only one with liner notes, and in those the writer rightly points out that Harry's sounds are not merely modern, but timeless in their beauty, which accurately sums up a fair amount of Harry's sensibility. The sounds are fresh, natural, and complicated. They sometimes seem unearthly, but not cacophonous. It's heavenly noise, the vital balance of the sacred and secular, like rich soil. Val described the effect perfectly as "therapeutic."

The range of sounds is astounding. It can be accounted for not only by the variety of designs that Harry developed, but also by his understanding of different alloys and his various playing techniques. Val showed us Harry's trick of rubbing coiled leather against the face of a gong, producing the sad-monster-in-the-canyon sound which turns up on most of the records.

Synthesizers are the only other instruments I know of that make sounds which build and disintegrate as slowly as Harry's do, causing me to wonder about the degree to which Harry was interested in the timbral concerns of electronic musicians. The similarity is striking; playing a Bertoia record on the radio once, I got a call from a friend who wanted the name of that great electronic piece. Given the Bertoias' naturalist tendencies, I figure that in reality the connection between these sounds and those of, say, Stockhausen's electronic work are tentative at best. In those rare instances when the flow of Harry's improvisation allows the listener to hear extended, isolated sounds, the sound's complexity allows the listener to enter it, dazzled and overjoyed.

Each *Sonambient®* record consists of two side-long improvisations. Choosing improvisation as his mode of performance makes sense simply because Harry wasn't a trained musician, but there is an added layer of creativity involved in allowing the sounds, in combination with one's own interior, suggest the structure of the performance in real time. As a result, improvisation is also a technique which reveals a tremendous amount about the performer's emotional state. I witnessed some of this first hand by seeing Val and Brigitta perform.

Val played first. Approaching each instrument with new eyes, he stroked, rattled, and clanged, making deliberate gestures one at a time. The sound developed out of Val's regular movements; the origin of the sound of these instruments is human energy. His normal walking pace (a solid clip, really) and attention span dictated the arrangement of the sounds in time. Ultimately, his playing developed out of a sense of wonder, paying particular attention to the vertical rod pieces which swayed in waves, broke apart, and came back together again.

After a short while, Brigitta announced that she wanted her turn. First thing, she picked up the gong mallet and marched to one gong then another, vigorously whacking them over and over. This seventy-five year old woman pounded the bejesus out of these five-foot, hollow pillow gongs. Resonances built with so much force that the room overflowed with sound. I was literally thunderstruck. If there were grand organs in Bali, they would probably sound like this. Brigitta demanded all the life that each gong would give, and as quickly as she began, she stopped, chuckling to herself and bowing demurely.

Some of Harry's character is also revealed in his recorded improvisations. The performances have a wide emotional scope within and between pieces, despite the sameness of the sounds from piece to piece. *Mellow Tops* is understated, using the grouping and layering of related sounds. Sounds are sustained while each goes through amazing internal shiftings. *Elemental,* in comparison, is downright disturbing. It's a speedy drone, a little too intense. Something in the background sounds like a hedge trimmer down the street. One performance is undular like deep, warm waves, the next is shimmery like the surface of a windy lake, another sizzles like icy snow. Moods range from focused and invigorating to loose and searching, all of them are warm, human, and confident. Over and over, what resonates is a sweet calm which flows from one sound to the next.

My best guess is that the performances were recorded roughly in order of their catalog numbers, because it really

seems that the higher number records have more refined and imaginative improvisations. But it's just a guess. My favorite performances have the most obvious continuity, sounds developed by repeating them with slight variations or bringing a second sound out of the first, rather than playing one sound, letting it hang, and moving on to the next. *Energizing*, for instance, has this flow. Patterning sounds to resemble melody, but without a real tune, is another of Harry's techniques, resulting in the brief materialization of a beautiful, old song, the tune long since forgotten, but the feeling reawakened out of the blue.

I imagine that the selection of excerpts for release must have been based on general feel, though many pieces appear to be organized around a particular moment or series of moments where things really come together. Playing times of sides vary considerably, and the beginning and ending of each pieces is chosen and edited carefully. (I especially like the fade in on *Continuum.*) Three sides, *Swift Sounds, Near and Far,* and *Here and Now* were made by running the tape backwards.

Swift Sounds is the strangest of the three. On first listen, I thought it might have been a tape collage. I now think that the tape is simply sped up, producing a weird, disjuncted feeling. Sounds make a slow, high climb like an orchestra of wildly ecstatic tamboura players. On the other hand, *Near and Far* seems slowed down and dreamy, and *Here and Now* spins and swirls unlike either of the other two. Which raises the question, how and to what extent are these edited? Was there any double tracking? I don't know. Maybe Val or Brigitta do.

Harry appears to have been comfortable with a home-made feel with the creation and presentation of these records. They're cheap pressings made from hissy tapes. If you buy a copy now, keep in mind that they're stored horizontally with or, more often, without shrink-wrap in a dusty basement close to where Val welds. So, yes, some are warped. The feeling of the releases has the good-natured sense that someone is cheerfully showing you something they've found, "neat, huh?" I wonder if the somewhat earlier Gate 5 records by Harry Partch were an influence in the creation of these.

Bertoia is set apart from other early examples of independently released LPs by his unique aesthetic and brilliance in producing the maximum effect with a minimum of elements. The front covers, for instance, are all black and white photographs of the sculptures or some detail of a sculpture. The photos, which I assume Harry took since only the *Original Sonambient* has a credit for the cover, show a nice development toward increasingly powerful, and, generally speaking, concise abstract images.

The back cover is nearly blank (except for the *Original Sonambient*) with only the design for the label, including the wonderful titles of the pieces. The label design is white with a single, black bar across it, which says "Sonambient" (meaning "sound" "environment.") While spinning, the black bar produces an optical illusion of faster and slower motion when seen from an angle, which describes Harry's work nicely; everything simplified to the point where your consciousness can rest peacefully on your own perception. When that happens, delight and wonder arise naturally.

THE HARRY BERTOIA SONAMBIENT LPs

10570 Original Sonambient; Bellissima, Bellissima, Bellissima / Nova
1023 Space Voyage / Echoes of Other Times
1024 Swift Sounds / Phosphorescence
1025 Unfolding / Sounds Beyond *
1026 Gong Gong / Elemental
1027 All and More / Passage
1028 Energizing / Mellow Tops
1029 Continuum / Near and Far **
1030 Swinging Bars / Vulcan's Play **
1031 Ocean Mysteries / Softly Played
1032 Here and Now / Unknown *

* Also issued on *Unfolding* CD by PSF (Japan)
** Also issued on *Sonambient* Compact-Disk 1 by Harry's family.

For more information or to order, write to Bertoia Studio, 644 Main Street,Bally, PA 19503-0383. Fax (610) 845-7128.

OSTENHORN

by Philip J. Ostendorf with Bart Hopkin

As an amateur musician, I have sometimes felt envious watching a professional play a long and complicated passage to perfection. Still, I know deep down inside that the professional performer has practiced for many years to reach his or her level of mastery. For an amateur musician playing that same long and complicated passage on one of the standard wind instruments, the odds are quite good that the player will choose at least one of seven possible valve combinations, seven slide configurations or twenty-one port openings incorrectly and break the magic of the performance.

What can be done to help the amateur brasswind player move toward the playing level of the professional? Is there the possibility of a yet-thought-of instrument that might be invented to give amateurs an earlier possibility of playing by ear without error? Perhaps a brasswind that would play by lip control alone?

This is the quest of my treatise.

This treatise is dedicated to the great number of amateur (from the Latin, meaning in this case, those who love) musicians who yearn for the gratification of playing by ear with fewer errors earlier in their musical career.

The instruments usually referred to as brasswinds are those in which the sound is produced by buzzing the lips into the mouthpiece. This delivers the air into the horn in a rapid series of pulses. The body of air within the horn is naturally prone to resonate at specific frequencies, determined by the length of the horn and other factors. When the pulsing frequency of the buzzing lips comes into agreement with one of the resonance frequencies in the horn, the two reinforce one another, and the result is a rich and resonant tone with well defined pitch.

The player determines which of the available resonances will sound by the degree to which he or she tenses the lips to produce a buzz of higher or lower frequency. Although the player can deliberately buzz on off-frequencies, the horn itself tends to strongly pull the buzzing frequency in line with one or another of the natural resonances. The player can feel the tone centering on the resonance frequency with its resulting richness of sound. Skilled players learn to move with agility between the well-centered tones of the several resonances, thus producing the different notes required to play melodies.

The set of available resonance frequencies in a typical horn corresponds to the pitches of the harmonic series, from the second harmonic on up. (The upper limit depends on the dimensions of the horn and mouthpiece, and the skill of the player.) In the lower part of the series, the tones are too far apart to form a complete scale. Thus, with simple horns such as bugles, complete diatonic or chromatic scales are not available. The tones become progressively closer together the higher one goes in the harmonic series, but even in the upper parts of a horn's range, the available tones don't always agree with those needed for a conventional Western scale.

There are several ways to make the missing tones available. Different approaches can be seen in the several types of horns that have been made and played over the years:

Natural horns, such as the bugle and Cor Naturelle, are those which have no provision for other tones, and can only play the tones of the harmonic series. Typically the player can comfortably produce the second through the eighth harmonics, offering seven pitches over a range of two octaves. Higher harmonics can be produced with a smaller mouthpiece and some practice.

Trumpets, cornets, baritones, French horns and tubas also typically offer seven tones of the harmonic series over a range of two octaves, but they also have at least three valves. By adding to the sounding length of the horn in half-tone increments, the valves allow for six additional families of harmonics. These serve to fill in the gaps, providing a full chromatic scale of two and a half octaves.

In a manner analogous to the trumpet family, trombones have a slide with a closed position plus six half-tone length extensions, again yielding a chromatic scale of over two octaves.

Finally, the now-rare horns known as ophicleides and serpents have side holes, or ports, like those on woodwind instruments, to provide additional tones. Unfortunately, the tone quality in these instruments becomes poorer as ports nearer the mouthpiece are opened, making the timbre inconsistent through the range.

With this background, I can now state my goal more clearly. It is to find a way to make a brasswind instrument which can produce a complete scale, yet which doesn't require valves, a slide, or sideholes. Rather, it should be able to produce all the tones of the scale by control of lip tension alone ... an instrument playing like a natural horn, but without the missing scale tones. What this comes down to is a search for some way to make a horn which has natural resonances not just at the tones of the harmonic series, but at each of the required scale degrees. With such a horn, by lip control only you could play any melody that came through your mind.

Over a period of years I have tried several different approaches in this quest for a lip-controlled horn. Some of my early attempts, which did not prove successful, can be seen in the photos on the following pages. One was a horn with one mouthpiece and one bell, but with five individual routes of varying length branching off near the mouthpiece and rejoining near the bell (see photo 1). There were no valves to direct the sound wave along different routes; all routes were open. The thought was that the route corresponding to the desired resonance would respond with the correct lip buzzing tension, leaving the other routes mute. It was

a fine idea, but in practice the recombination of the various routes introduced a myriad of acoustic disturbances successfully fighting each other as they arrived at the bell junction out of phase. In short, the results were unsatisfactory.

Another attempt was to have a single mouthpiece playing into a five-branch, five-bell horn (see photo 2). The main problems were two. One was the division of the lip buzz energy into five branches, which left only one fifth of the total energy input to create the required standing wave. The other four branches provided only an air-rush noise. The second problem was that the rate of energy division had to be very small to prevent the formation of a single very high pitch similar to what might be expected if there were a port or sidehole in the horn wall at the branching point.

A later innovation was a horn with a single mouthpiece leading to two branches and bells (see photo 3). This horn performed better than the five-branch horn, but the results were still not good enough.

Yet another attempt — this one using a standard valved horn — was to pick up the lip buzz in the neck of the mouthpiece with a microphone, then sort out the intended frequency with a frequency analyzer, and then empower electromagnets through relays to depress the proper valves (see photo 4). Unfortunately, it was found that the lip buzz does not develop sufficient strength and clarity if the horn is not already configured to provide the right resonance to focus the pitch. Once again it is impossible to lift oneself with one's own bootstraps.

All of the failed attempts pointed in one general direction. That was the use of the higher ranges of the horn's family of natural harmonics. This thought is probably better tabularly portrayed than written in words. Figure 1 will illustrate.

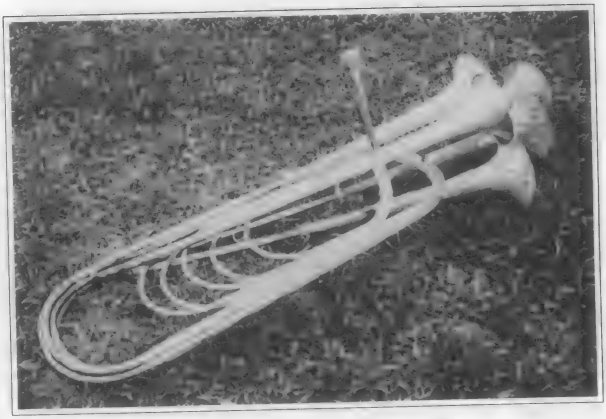
Figure 1 provides the vital statistics of the harmonic series and the desired scale degrees for a prototype natural horn, around which we will develop our ideas. In the figure you can see the wider spacing of the available tones in the lower part of the horn's natural harmonic series, and how the tones become closer together as you progress up through the series. By focusing our efforts a little higher in the series — on harmonics numbers five through twenty — we come up with a set of available harmonics that brings us closer to a complete scale than would be the case lower in the series. Specifically, on a natural horn with a fundamental of B*b*, using harmonics five through twenty, you can produce most of the tones of an F major scale over two octaves. However, as the figure indicates, there are three tones in the scale for which the nearest available harmonics are so far out of tune with the standard scale pitch as to be unusable. And there are two more scale degrees for which there are no harmonics nearby at all. The challenge, then, is to find ways to 1) synthesize the missing notes, and 2) shift the unusable notes to a usable frequency. To play in the trumpet's range, the horn must be about the length of a trombone.

FIGURE 1

The third and fourth columns in this chart show the tones of the harmonic series, harmonics 5 - 20, for a natural horn of a little over 18 feet, comparable a B*b* tuba. The first and second columns show the note names and frequencies for a standard scale in twelve-tone equal temperament over the same fundamental. By comparing the frequencies of the standard scale tones with the frequencies of the natural harmonics, you can assess which tones of the standard scale are available in the natural horn. It happens that most of the tones of an F major scale are present in natural horn, and to highlight this as a point of reference, the scales degrees of F major appear in bold print. Those F major scale degrees for which no close approximation appears among the natural harmonics have been marked at the far right with the word "missing." Those for which one of the natural harmonics appears in the vicinity but not close enough to sound in tune without adjustment bear the word "unusable."

NOTE	FREQUENCY IN STANDARD SCALE	MODE	FREQ OF NEAREST NATRL HARMONIC	SCALE DEGREE	
D	**587.33**	**20**	**582.70**	**la**	
D*b*	554.37	19	553.56		
C	**523.25**	**18**	**524.43**	**so**	
B	493.88	17	495.30		
B*b*	**466.16**	**16**	**466.16**	**fa**	
A	**440.00**	**15**	**437.03**	**mi**	
A*b*	415.30	—	—		
G	**392.00**	**14**	**407.89**	**re**	**unusable**
G*b*	370.00	13	378.76		(unusable)
F	**349.23**	**12**	**349.62**	**do**	
E	**329.63**	**11**	**320.49**	**ti**	**unusable**
E*b*	311.13	—	—		
D	**293.66**	**10**	**291.35**	**la**	
D*b*	277.18	—	—		
C	**261.63**	**9**	**262.22**	**so**	
B	246.94	—	—		
B*b*	**233.08**	**8**	**233.08**	**fa**	
A	**220.00**	**—**	**—**	**mi**	**missing**
A*b*	207.65	—	—		
G	**196.00**	**7**	**203.95**	**re**	**unusable**
G*b*	185.00	—	—		
F	**174.61**	**6**	**174.81**	**do**	
E	**164.81**	**—**	**—**	**ti**	**missing**
E*b*	155.56	—	—		
D	**146.83**	**5**	**145.68**	**la**	

And now we come to the heart of my idea. I have developed a very simple device for the purpose of selectively modifying the resonances in the horn. It will allow us to create the resonances we need to add the missing tones, and to shift the out-of-tune harmonics to bring them in line with the desired scale degrees. The device consists of a set of four copper tubes, a little under an inch in diameter, open at one end and capped at the other. These tubes are cut to carefully calculated lengths, and inserted to carefully calculated depths into the bell of the horn using a simple mounting system.



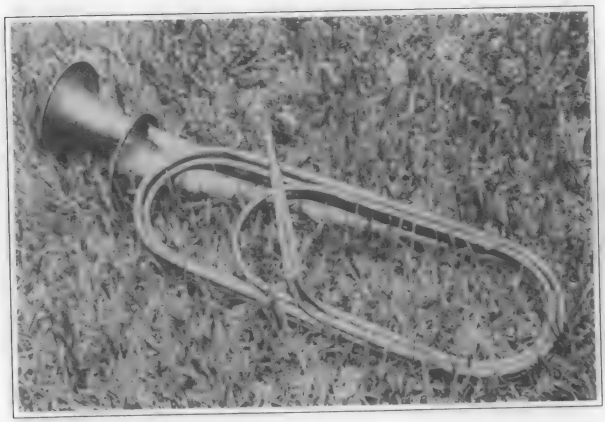
EARLIER UNSUCCESSFUL ATTEMPTS

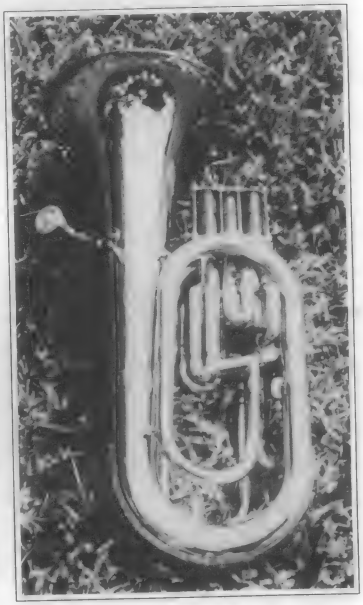
Upper left: Photo 1. Many paths leading to a single bell.

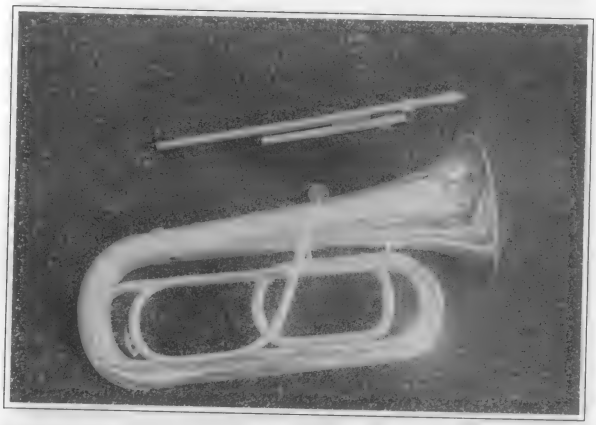
Upper right: Photo 2. Five separate bells.

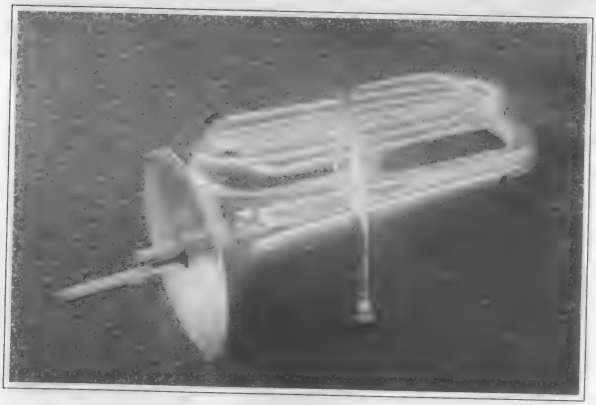
Lower left: Photo 3. Two separate bells.

Lower right: Photo 4. Electromagnetically controlled valves.









Above: Photos 5 A and B. Ostenhorn of B*b* tuba length, shown with the resonator tubes alongside (above), and in place in the bell (below).

Below: Photo 6. Cor Naturelle with resonator tubes.

Here's how the device works.

Experiment has shown that a tube stopped at one end, with the open end inserted into the bell of the horn, will accomplish two things. First, its insertion will create an acoustic disturbance that alters the pitch of certain tones, much as the player's hand in the bell of a French horn affects the pitch. Second, the resonances of the inserted tube interact with the standing waves of the horn in a way that can create new resonances at new frequencies.

Working with the prototype horn described in Figure 1, using a configuration of four capped resonator tubes, I have been able to adjust and synthesize as needed to provide resonances at each of the tones of the F scale. The resonances are strong and distinct enough that, as with a natural horn, the player can find and control each of them by lip tension, and feel the tone centering on each resonance to produce a clear pitch.

Determining the optimal tube lengths and locations was not a simple task. The acoustics of the situation are complex, with many facets interlocking. In many cases the insertion of the resonator at a particular location to optimize one pitch has the unwanted effect of throwing off another pitch. To make sense of the process, I developed mathematical models not only to help determine the best tube lengths and locations to correct the existing problems, but also to assess which interventions would have the least unwanted effects on neighboring tones. In the end, the resonator-tube arrangement that I arrived at was not a matter of having mathematically determined the perfect solution. Rather, it was more one of having used mathematical models to help me as I cast about among the possibilities to find one that proved, in practice, to work well.

With the resonator tubes in place, we now have a valveless horn capable of playing a major scale over two octaves. But what about the remaining chromatic tones between the scale degrees? I have not attempted to create additional tube resonances at these pitches. Instead, I have employed a single side hole near the bell to raise the horn's pitch by a semitone. The new set of resonances that this introduces provides the needed chromatic tones, making the full chromatic scale available through the opening and closing of the single side hole. In a case where resonator tubes have been added to a valved horn to make it playable valvelessly, then the side hole would not be necessary, as the chromatic scale would become playable through a limited use of the valves to achieve the same effect.

I have now made sets of resonance tubes for several instruments, including:

- a horn equaling a double B*b* tuba in length, with a bore like that of a euphonium (which suits

my trombone training and range), playing in the key of F from D_3 through C_5 (Photos 5A and 5B);

• an E*b* Cor Naturelle, with an E*b* tuba length and French horn bore, playing the key of B*b* from G_3 through F_5 (Photo 6);

• an F horn with a ½" copper tubing body and a trombone bell, playing the key of C from A_3 through G_5 (Photo 7); and

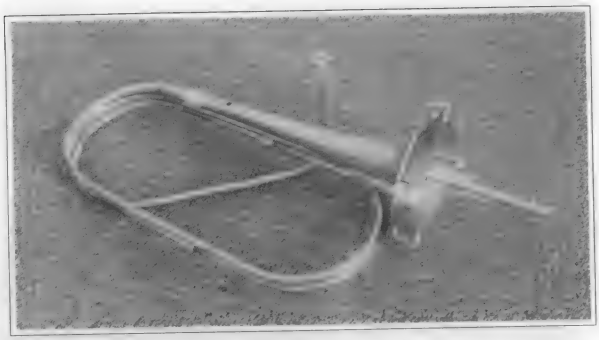
• a standard baritone horn played with valves 1 and 3 depressed as an F horn playing the key of C, from A_3 through G_5 (Photo 8). The sharps and flats are achieved through lifting the first valve and depressing the second valve, shortening the total horn by one semitone.

Of these, the standard baritone produces the finest tone, a tribute to the producer (*Courtois*). The second best is the Cor Naturelle (*Cousenon*). Of my assemblage horns, the B*b* tuba, with parts from *Meinl*, is third in good sound production, and the Olds trumpet bell and ½" copper pipe is poorest in quality.

I have used two sorts of mountings; one in which a framework of four wires clips over the rim to center the tubes in position in the bell, and one in which the tubes are held in a support that seats itself in an upward-facing bell. Neither mounting significantly inhibits the standing wave, and both can be effortlessly inserted or removed.

The work described here is covered under U.S. patent #5,133,328.

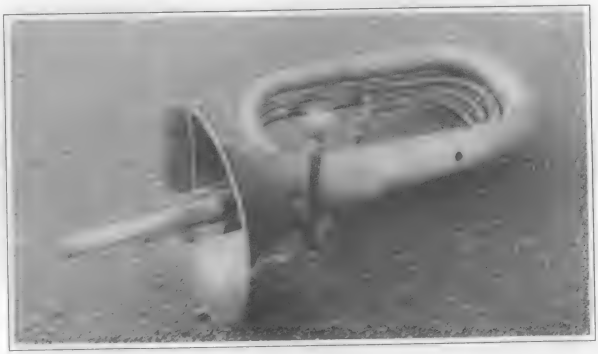
If you wish to know more about the Ostenhorn system, you can contact me at 3331 S.E. Fairway West, Stuart, FL 34997; phone (561) 221-0975. A demonstration video is available at the author's nominal cost, as well as a treatise which provides much more technical detail than this article.



Top: Photo 7. F horn, playing a C scale, with a body of copper tubing and a trombone bell.

Second from top: Photos 8 A and B. A valved horn by Courtois, provided with the resonators shown in the photo at right.

Below: Photo 9. Got time for one more? Here's an F horn, playing a C scale, made of parts from a Kanstul baritone horn.



Phil Ostendorf is a retired civil engineer and architect. As an amateur musician, he has played brasswinds in school and community bands for over fifty years.

Special thanks to:

Dr. Mike Wagner of Florida International University, and the late Arthur H. Benade of Case Western University, for their encouragement and response.

Mr. Zigmant Kanstul of Kanstul Musical Instruments, and Mr. Jack Faas of Boosey and Hawkes, for their assistance.

WALNUT ANGKLUNG — A 2x4 CONTEST ENTRY

by Art Liestman

I am a member of The Pacific Woodworkers Guild, a club for woodworkers in the Vancouver, B.C. area. Our Guild has an annual event called the "2x4 Contest." The contestants are each to make a project from a single piece of wood that measures 2 inches by 4 inches by 8 feet. In addition to this piece of wood, contestants are allowed to use glue and any finishing product (such as varnish or paint). However, no other pieces of wood or hardware are allowed. The contest entries are judged on several criteria including originality, craftsmanship, and use of materials.

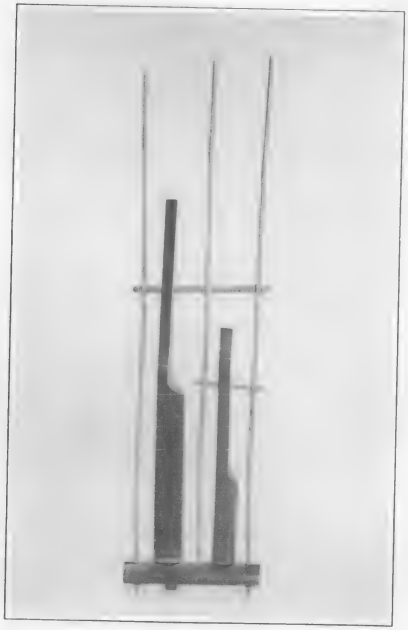
My musical instrument making experience has focused on making various types of hand drums, plus a few xylophones and wood blocks. My musical interests include an enthusiasm for bamboo instruments from Indonesia and particularly the shaken angklung.

Anklung typically consist of two or three bamboo tubes which are tuned an octave apart and suspended in a bamboo frame. At the bottom of each tube is a short tab that fits into a slot in the bottom of the frame.

When the frame is shaken, the tab hits against the end of the slot, vibrating the tube and sounding the note. The tube is partially carved away at the top so that the resulting resonator (the portion which is still a tube) matches the frequency of the entire piece of bamboo as it vibrates. Anklung come in sets of several notes tuned to various scales. In anklung musical performance, each musician plays one or two notes and melodies are played by the group with each player sounding his/her note at the appropriate times. More rarely, angklung are suspended from a frame, making it possible for a single player to play the full set.

I decided to make some anklung-like instruments for my contest entry. The constraints of the contest rules made the project quite challenging.

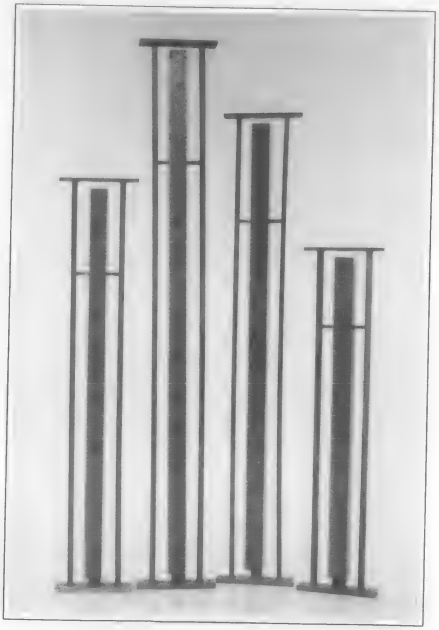
My first design decision was to make single tubes in each frame rather than paired tubes as in real anklung. I wanted at least four notes with reasonably low pitches, but wasn't particularly



Left: Traditional bamboo angklung

Right: Art Liestman's walnut angklung set

Photos by Wolfgang Knauer



interested in trying to tune them to a specific scale. The tubes would be four sided and made out of 1/4" by 2" strips ripped from the 2x4. The plan was to first rip enough of these 1/4" strips for the tubes and to use the remaining wood for the frames.

Before beginning with my actual 2x4, I tried a simple experiment. Due to the time limitations of the contest, I couldn't do more extensive testing.

I made two 2-foot long tubes and began sawing away pieces of the tubes to see if I could discover the secret of tuning the tube and resonator as is done on the bamboo anklung. Although I reduced the tubes to sawdust and small scraps, I failed to chance upon the secret, so I decided to use complete tubes.

I obtained a lovely eight foot long walnut 2x4, but in order to get it home (on a rainy winter day in my small car) I had to make it shorter. I decided to cut it into 3-foot and 5-foot lengths. This ultimately affected the scale that I obtained since I could make two of the sets up to 5 feet long but the others would have to be less than 3 feet. I then chose to make the four frames approximately 5', 4', 3', and 2'6" tall with the corresponding tubes being about 2" shorter. Since I was not trying to tune to any particular scale, the actual sizes were not particularly important. It was, however, important for the contest to use as much of the wood from the 2x4 as possible.

After cutting the 1/4" by 2" strips, I mitered their edges and glued up the four tubes. I added decorative splines on the corners of the tubes which provide visual interest and strengthen the joints. The frames were made of 3/4" by 1/2" stock for the vertical components and some of the leftover 1/4" by 2" stock for the horizontal components. The frame parts were joined using through-mortise and tenon joints — a first for me. The tube was suspended from a 1/4" by 1/4" cross piece that was through-mortised into the frame sides.

Another change from the bamboo original is the mechanism for sounding the tube. Rather than putting a tab at the end of the tube to fit into a slot in the frame, I attached a short, stout piece of walnut to the bottom frame piece extending about 2 inches up into the suspended tube — a sort of fixed clapper for the moving walnut bell.

I ended up with 4 notes with approximate pitches D (below middle C), G, D, and G# (above middle C). The notes are not very pure and are difficult to distinguish. (In contrast, the bamboo anklung notes are much more pure.) When assembled on the frames, the highest-pitched tube resonated somewhat better than the others. In an attempt to balance the sound, I added sound holes to the three other tubes as described in Hopkin* for the notes of metal tubular chimes. Due to the constraints of the contest, I didn't have the luxury of experimentally determining how many sound holes would give the best results. I chose to use three holes in each tube (rather than four). Fortunately, this improved the sound of each of these three tubes and all four tubes were reasonably balanced in terms of volume. Finally, I applied two coats of a Danish oil finish to the walnut anklung and then a light coat of furniture wax. The instruments are very attractive and have a pleasant sound.

The constraints of this contest created a wonderful challenge requiring creativity and placing demands on my technical abilities. In the initial stages, the planning had to be quite detailed, giving consideration to the order of stock cutting and the amount of material which would be lost to saw kerfs. As the project evolved, I made a few minor design changes but these were severely limited by the contest rules and the previous decisions. Near the end of the project, it became critical to make no mistakes since there was little material available for spare parts. For example, two of the 1/4" by 1/4" cross pieces broke when I tried to cut the tenons on their ends. Fortunately, I had just enough material to replace them, but I would not have been able to replace them if two more had broken.

On the night of the big competition, each contestant had a few minutes to describe his/her entry. After describing some of the construction details, I managed to convince three volunteers to help me play a simple rhythm with the walnut anklung. After all of the entries had been shown, the members voted to determine the four prize winners. I was quite pleased to win second prize for my instrument, considering the stiff competition. The first-place entry was a very nice sculpture of a butterfly made from a construction grade 2x4. While constructing the walnut anklung, I came up with a great idea for a contest entry for next year. It's another musical instrument, but I'm not giving away any more information about it. The element of surprise is a part of my strategy for next year's contest and I intend to win first prize next time!

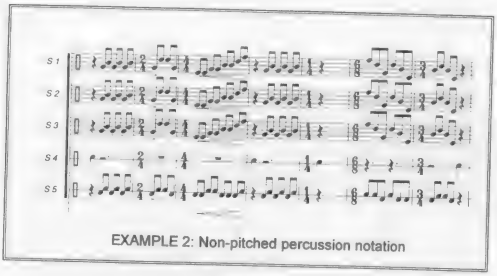
Art Liestman is an amateur instrument maker and semi-retired drummer. He generally makes various drums based on African and Cuban originals but occasionally makes something slightly unusual. He can be reached (at his day job) at art@cs.sfu.ca.

*B. Hopkin, *Making Simple Musical Instruments*, Lark Books, 1995, p. 22.

ALCHEMY IN THE NINETIES

...turning garbage into gold ...

by Jan Jarvlepp



EXAMPLE 2: Non-pitched percussion notation

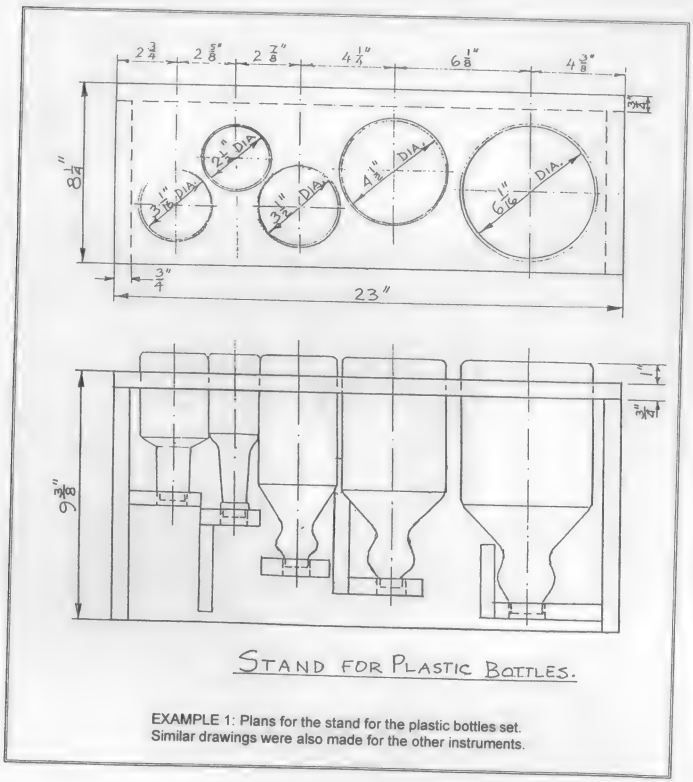
Transformations by Jan Jarvlepp is a 27-minute concerto for recycled garbage and symphony orchestra featuring five percussion soloists playing on discarded household objects. Completed in 1995, it was the culmination of four years of part-time experimentation that involved developing musical instruments out of trash and finding usable rhythms that could integrate them with the orchestra, combining unpitched and pitched compositional methods, and finally, carrying out the compositional work.

The three-movement concerto was composed for the Ottawa Symphony Orchestra conducted by David Currie with soloists Jon Wade, Paul Vaillancourt, Ken Simpson, David Stachon and Eric Vaillancourt. They premiered it on Jan. 22, 1996 in Ottawa. The audience as well as musicians reacted very favorably to the performance and the local press gave excellent coverage to the unusualness of the project.

However, before rehearsals could begin, the sundry tin cans, bleach bottles, glass jars and other objects that I had been experimenting with had to be mounted in a way that was satisfactory for professional percussionists. Playing surfaces had to be level, side-to-side wobbling had to be eliminated and vertical bouncing had to be prevented without sacrificing the already compromised acoustic qualities of the sonic objects.

My father, mechanical engineer Eric Jarvlepp, drew up some plans for the instruments' wooden frames and then constructed them using the dimensions of the objects that I had chosen. Modifications were made when objects were too loose — causing wobbling, or too tight — causing muting of the sound. (See example 1)

Percussionist 1 plays five metal cans in the first and third movements. They are not specifically pitched but rather are low, medium



EXAMPLE 1: Plans for the stand for the plastic bottles set. Similar drawings were also made for the other instruments.

low, medium, medium high, and high. Each can is notated on a line of the standard musical staff. (See example 2) After experimenting with about 30 cans, I found that those with concentric rings on the bottom gave a more desirable bright sound. I also found that cans with a leady grey appearance were to be avoided because they gave a dull sound. The three larger cans were held by pieces of eaves-trough netting which was designed to keep leaves out of eaves troughs. This material was too stiff for the two smaller cans and would have caused bouncing, so the more pliable mosquito netting from a screen door was used. Felt lining was placed around each can's hole where the can meets the top wood panel in order to minimize wobbling. For the first performance the cans used were: President's Blend 1.1 kg coffee can (6 1/16" diameter x 6 3/4" long), Mother Parker's Automatic Filter Drip 1 lb. coffee can (4 1/16" diameter x 5 1/2" long), President's Blend Gourmet Coffee 13 oz can (4 1/16" diameter x 5 1/2" long), Habitant Pea Soup 14 oz

EXAMPLE 3: Metal cans in wooden frame
Photo by Eric Jarvlepp

EXAMPLE 4 (above): Glass jars in wooden frame Photo by Eric Jarvlepp

EXAMPLE 5 (below) : Plastic bottles in wooden frame Photo by Eric Jarvlepp

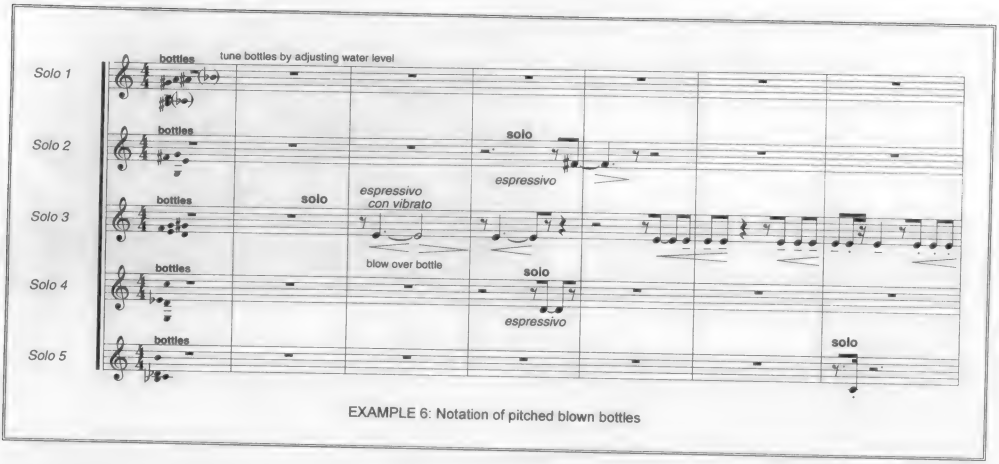
can (2 15/16" diameter x 4 1/8" long) and Campbell's tomato soup 10 oz can (2 5/8" diameter x 3 3/4" long). The cans were mounted with pitches ascending from left to right as in keyboard instruments. (See example 3)

For subsequent performances, musicians should search through their own garbage to find a similar set of cans. Since the first set of instruments was built, the manufacturers have already changed some dimensions of their products so that future sets of cans will likely have some variation from the original set. This is all part of the piece and its relevance to the contemporary public.

Percussionist 1 is also required to pop a paper bag in the second-last bar of the first movement. This skill should be inherent to anyone who has taken a bag lunch to high school.

Percussionist 2 plays five glass jars which were selected, notated, mounted and pitched in much the same way as the metal cans. I found that cylindrical or near-cylindrical shapes, such as spaghetti jars and wine bottles, gave a much more usable sound than irregular shapes such as Kraft salad dressing jars. Plastic from six-pack canned drink rings was used to keep the smallest two jars from bouncing. For the first performance we used: President's Choice 1.8 litter pasta sauce jar, Classico 700 ml square spaghetti sauce jar, Bordeau 750 ml wine bottle, Clearly Canadian 325 ml mineral water bottle and a Gilroy Farms 120 g crushed garlic jar. (See example 4)

Percussionist 3 plays five plastic bottles which were selected and mounted following the same criteria as the metal cans and glass jars. Felt lining was placed around each bottle's hole where the bottle meets the top wood panel in order to minimize wobbling. As the greatest problem with bouncing occurred with the plastic bottles, they were strapped to the wooden frame with copper wire so that the playing surfaces would remain stable. The bottles were also the least durable of the instruments and it was necessary to install a new set between the dress rehearsal and the concert. A percussionist suggested pouring a thin layer of varnish on the bottom of each bottle and allowing this to dry to give a thicker reinforced playing surface. The bottles selected were: No-name 3.6 litter



EXAMPLE 6: Notation of pitched blown bottles

bleach bottle, Javex 1.8 litter bleach bottle, Javex 900 ml bleach bottle, Heinz 375 ml vinegar bottle and No-name 500 ml vinegar bottle. (See example 5)

Percussionist 4 plays a maraca and three hubcaps which are notated on a single-line staff. The maraca can be made of a metal or plastic can with small pieces of metal or maybe bottle caps in it. If the maraca has difficulty articulating faster rhythms in more difficult passages, another type of discarded household object could be used for those situations. For example, one could drum on a water heater, humidifier, brake shoe or an old TV. However, the maraca should be used in all easier passages. The three metal hubcaps are not pitch-specific but are simply selected as low, medium and high and played with drum sticks. I found that plastic wheel covers were to be avoided because they gave a dull thud. Also, hubcaps with spokes, holes or irregular surfaces are not suitable for drumming. Initially they were mounted on a wooden stand for the first performance but the performer found that this arrangement muted the sound too much. He remedied this by clamping them to metal stands.

Percussionist 5 drums on a household recycling box placed on its end. A treble tone is found near a corner of the box while a bass tone can be had in the middle of the box handle. These two tones are notated above and below a single-line staff.

For the second movement, the five soloists abandon their percussion instruments to blow across glass bottles tuned to specific pitches by their water levels. Unlike the nonspecific pitch of the percussion instruments, notes of the regular chromatic scale are used here. Between them, the five soloists play 22 bottles. (see example 6) They end up articulating melodies in much the same way as a bell choir and can play chords of up to five notes. Some players decided to tape or otherwise attach the bottles to make a glass panpipe. The water level of each bottle was marked with tape and the pitch of each bottle was clearly labeled. For the third movement, the players go back to their percussion instruments.

In spite of the "trashy" nature of the instruments, the same professional skills that fine percussionists use daily are required to learn and perform this piece and to compensate for the acoustic shortcomings of recycled garbage as musical instruments.

Jan Jarvlepp is a freelance composer, cellist and teacher in Ottawa, Canada and a member of the Ottawa Symphony Orchestra. In 1981, he completed his doctoral studies at the University of California, San Diego after studying composition and 20th century music with Roger Reynolds and Will Ogden. Currently he is working on his second CD release and adding new works to his catalog of over 35 compositions. Among these is a new solo version of Transformations *requested by the well known virtuoso Evelyn Glennie. He can be reached at (613) 235-1530 fax/phone.*

RAMBLINGS

By Bart Hopkin

Today's topic: An unusual approach to bridge and soundboard design for string instruments.

Several guitar makers have experimented in recent years with designs for acoustic bass guitar. I have seen a number of these instruments documented in the pages of the excellent quarterly journal, *American Lutherie*. Most of them, as would be expected, resemble enlarged versions of standard guitars in their design. I haven't heard or played any of them in person myself, so I can't say how successful they are at projecting a strong bass sound, but they certainly are beautiful to look at in the photographs.

Not long ago I too built an acoustic bass guitar of sorts. I say "of sorts" because, while I intended for the instrument to function more or less as a bass guitar, it doesn't look much like either an acoustic guitar or an electric bass guitar, and it's a far cry from the handsome instruments that have appeared in the pages of *American Lutherie*. I used simple, straight-sided construction, and employed inexpensive materials. Its size and shape make it awkward to play. In creating it I was more interested in exploring ideas in instrument design than I was in creating a fine piece of work.

The design ideas I was exploring had to do with the the ways in which a string drives a bridge, and the bridge drives a soundboard, and the soundboard drives the surrounding air. Before going into detail, let me pause here to review some background information in those areas. In pianos, harpsichords and hammer dulcimers, the string is excited into motion perpendicular to the plane of the soundboard. That's good, because it drives the soundboard in the right direction — the direction in which it naturally flexes in order to move the adjacent air. This directional agreement between the string motion and the soundboard motion makes for an efficient transmission of vibrational energy. In instruments of the violin family, in contrast, the bowing excites the string into a motion that is more or less parallel to the soundboard. Through a pivoting action involving the tall bridge and soundpost, the parallel movement converts to the required perpendicular impulse on the soundboard, and once again you get an efficient transmission.

With guitars and most other plucked instruments with fingerboards, the situation is less clear. Typically, players of guitar-like instruments don't consistently pluck in one direction; the direction of plucking varies with different strokes. The only plucking direction that almost never occurs is perpendicular to the soundboard, since plucking that way causes the string to slap against the fingerboard. So with these instruments the string doesn't transmit its energy and drive the soundboard as effectively as the hammered piano string or the bowed violin string.

From a musical point of view, this isn't necessarily bad. The fact that the string vibrates in a direction that doesn't translate as directly into soundboard movement means that the string delivers its energy to the soundboard more slowly. The slower transmission allows the plucked string to sustain longer, rather than quickly dying away because it has rapidly delivered all its energy to the soundboard. By the same token, the plucked string is not as loud as it would be were it to deliver its load of energy more rapidly.

This directional factor is just one of many that play a role in the rate of energy transmission and the resulting levels of volume and sustain. Another is the mass and rigidity of the bridge and soundboard. The heavier and more rigid they are, the less the string will be able to drive them. Thus, a string will deliver its energy very rapidly to a light-weight soundboard, for a louder sound of quicker decay. With a heavier board, the tone will be quieter, but, other things being equal, it will sustain longer.

It was these facets of the energy transmission process that I wanted to explore in the acoustic bass guitar. My intent was to make an acoustic bass with lots of oomph — a full, bottomy sound, with maybe even some thud to the attack, to lend a strong underlying rhythmic feel. I translate this, in part, as: rapid delivery of energy for a loud tone and rapid decay. So, in keeping with the above discussion, I wanted to try to 1) create a situation where the direction of the impulse on the soundboard was perpendicular to the plane of the soundboard, and, 2) make the soundboard light and flexible.

But there are limits as to how flimsy I could make the soundboard. The obvious limit is that if the board is too weak, it will collapse under the pressure of the strings and the instrument will be ruined. The less obvious but more interesting limit is that if the soundboard is *extremely* yielding in response to the string's impulses (imagine a bridge mounted on foam rubber), it won't provide a sufficiently well defined anchor at the string's end point to reflect the travelling waves in the string. Without adequately reflected waves, the string won't set up a good standing wave, and there won't be much of a vibration. In a less extreme case, something of a standing wave may be set up, but not a very convincing one. The result might be a very short-lived, dull tone, possibly with poorly defined pitch, and perhaps a lot of thud or thumpy sound at the beginning.

Since I liked the idea of a thumpy sort of sound, and since you only live once, I decided to throw caution to the wind and make the soundboard as weak as I possibly could — that is, as weak as it could be without breaking under the stress of the strings. To this end, I had a clever idea for a way to make a soundboard far lighter and weaker than could ever work on a standard bass. I'll explain that in a minute. First, let's go back to the direction of the implulse.

I mentioned earlier that guitar players tend to pluck in all different directions. While some electric bass players likewise play with varying plucking directions, there are a some widely used bass-playing techniques that are more consistent in this regard. I decided to assume that the instrument I was making was for a bass player who uses one of these consistent-direction techniques. (Actually, chances were that the primary player of the instrument would be me.) The typical direction of string vibration resulting from these strokes is somewhere around 45 degrees off of the soundboard-perpendicular direction that I wanted. So, I

made the instrument's neck and bridge tilted, putting the plane of the fingerboard and the strings at a little less than a 45 degree angle relative to the soundboard, as can be seen in the accompanying diagram and photograph. With this angling of the fingerboard, the string's direction of vibration resulting from the intended plucking technique is pretty close to perpendicular. Yet, since the vibration is *not* perpendicular to the tilted fingerboard, the string has more room to vibrate freely without slapping against the fingerboard.

And now, back to my idea for the extra-flimsy soundboard. If the strings of an instrument of this sort are anchored, guitar-like, directly to the bridge, then the soundboard must be strong enough to hold their full tension. I rejected that arrangement as unsuitable for an extra-light soundboard. If, as on a stand-up bass, they are anchored to a tailpiece below, then the soundboard must be strong enough to take the very forceful downward pressure of the strings at the point where they cross the bridge. To accomodate the extra-light soundboard, I modified this arrangment. Instead of centering a tailpiece at the bottom of the instrument, I made a string-anchoring point at the bottom off to one side. I set the bridge, the anchoring point, and the nut that the strings cross at the upper end, all on the same level, so that the strings do not press down on the bridge. Instead, they press sideways against raised pins in the top of the bridge. The resulting pressure is sideways along the plane of the soundboard — a direction in which the board can take a great deal of pressure without breaking. The accompanying diagram illustrates the idea.

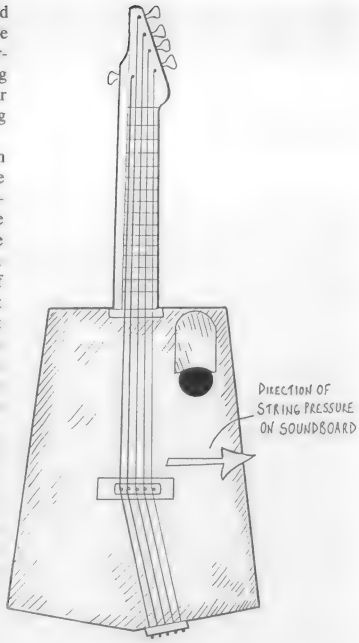
By handling the stress of the strings in this way, I was able to employ a flimsy soundboard of unreinforced 1/8" plywood. The perpendicular motion of the strings drives this soundboard very easily. Since the bridge is somewhat tall, the strings do exert some torsional leverage on it, causing the soundboard to distort a bit by bowing up on one side and inward on the the other, but this has not caused any problems.

The acoustic bass guitar described in this article. Apologies for the poor quality of the photo.

The completed instrument contains a few other idiosyncracies that I haven't mentioned here, but the two features just described — the tilted neck and the extra-light soundboard with the unusual bridging arrangement — are the most interesting for the current discussion. And so we come to the queston: what were the results of these innovations in the acoustic results?

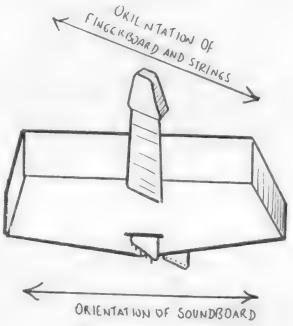
I think I can say that the acoustic bass sounds pretty good for something as crudely and inexpensively made as it was, and so much smaller than a full-sized stand-up bass. As hoped, the sound that it pumps out of its soundhole is full and bassy. The desired rhythmic thump at the start of the tone is there, especially for a listener standing in front (as opposed to the player positioned above). At the same time, the tone is fuller and warmer, less dull than I had expected. The volume is decent — quite respectable for a small and crudely made bass, but less than I had hoped.

To check whether my thoughts about direction of pluck had any value, a player can sabotage the instrument by deliberately plucking in the sideways direction, and comparing the resulting tone to that



Above: the string arrangement for the acoustic bass guitar, with the strings angling slightly to one side after crossing the bridge. This creates a lateral pressure, rather than pressing down on the bridge. Small vertical pegs in the bridge (actually wood screws), against which the strings press sideways, keep the strings in place at their proper crossing points.

Below: A view from above, showing the angling of the fingerboard, bridge and string anchor relative to the soundboard.



of the intended toward-the-soundboard pluck. As expected, the intended plucking direction yields a tone that is louder, and bassier, has more of a thump in the attack, and decays more rapidly. The difference is not overwhelming, but it's there.

It's harder to assess how my ideas about the flimsy soundboard proved out. On one hand, in all respects except volume the instrument performs much as I had wished, and so I can pronounce the experiment (mostly) a success. On the other hand, one could ask: is the reason the instrument behaves as it does really related to my theories about energy transmission? For any instrument, there are so many facets to the underlying mechanics of sound; I can't begin account for them all, let alone organize them into definitive conclusions about cause and effect. One thing I've learned in making instruments is this: reality is a richer, more complicated, more surprising and ultimately more beautiful thing than the simplified hypotheses one creates in theorizing. ("There are more things in heaven and earth, Horatio, than are dreamt of in your philosophy." — Willy the Shake, addressing scientists who think they can actually get a handle on it all.) Still, theories and models are often very useful in the process of feeling one's way to an effective design, and this acoustic bass seems to be a happy example of that.

A few more notes about the acoustic bass guitar:

The instrument has five strings, tuned like the four strings of a standard bass with the extra string a third or fourth above (take your pick). I have tried both steel-core electric bass strings and rope-core double bass strings. I like the steel strings better — they're louder, and despite all my talk about the value of thuddiness and thumpiness, I prefer the clarity of their tone. For the fifth string (not part of the standard bass string set) I'm using an unwound brass wire, which turns out to be reasonably close to its lower neighbors in tone quality.

The instrument is fretted, like an electric bass. But after a bit of listening, I think I will eventually decide to remove the frets and make it fretless. That will leave it with less sustain (due to damping from direct finger contact) and will take a little edge off the higher frequencies from the steel strings. It will also eliminate a problem I hadn't foreseen: the metal of the frets makes a lot of unwanted clicking and scratching noise against the metal of the overwinding on the strings.

I made two features of the instrument adjustable-after-the-fact, because I didn't have sufficient confidence that I'd get them right in the initial construction phase. One is the location of the bridge. It's fixed to the soundboard with the machine screws passing through adjustment slots in a piece that forms the bass of the bridge. This adjustment allows for fine tuning of the intonation resulting from the fret placements. The other adjustable feature is the size of the sound-hole, which affects the resonance response of the sound chamber. By adjusting the soundhole size you can, within limits, modify which frequency ranges the air chamber responds to most fully. This is an important consideration in bass instruments, since most of the strength in the lower frequencies comes from the air resonance. The adjustability takes the form of a partial soundhole cover which is glued in place with non-permanent glue, looking a bit like a droopy eyelid over the soundhole.

As I mentioned earlier, my acoustic bass is pretty awkward from an ergonomic point of view. I usually play it cello-ishly, being seated, with the instrument upright between my legs, lower end resting on the floor. I have found that I like the sound best when I pluck with a very heavy technique much like that used by some upright bass players, in which the whole lower part of the index finger lies across the string, plucks firmly and comes to rest on the adjacent string.

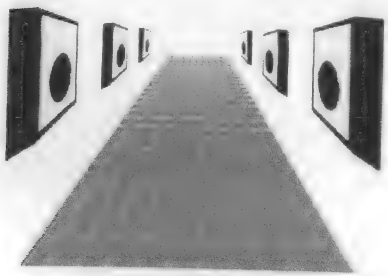
GREYWORLD SOUND SCULPTURE

by Andrew Shoben

Soundwall

Greyworld is an established group of sound artists who create sound installations and sculptures. Their work has been exhibited throughout Europe during the last four years. "Shopping," the most recent Greyworld project, took place at Forum des Halles, Paris, France in April 1996; the installation was a showcase for sounds which, having been extracted from a consumer soundscape, were isolated, and then reproduced in an exhibition space by means of large gold-framed loudspeakers. Each loudspeaker emitted a different constituent sound associated with Shopping: the hum and throb of an escalator, the scream of a disgruntled infant and the polished encouragement of piped muzak were among the exhibits.

Greyworld is involved not only in installation art, but also in the creation of tangible contact sculptures — objects which, when coupled with human interaction, produce sound. Let us begin in the acoustic realm, with Greyworlds Soundwall, a contact sculpture derived from a set of common barrier railings. A number of vertical bars within the railing frame have each had a segment removed to allow them to resonate; the size and position of the segment removed determines the pitch of the bar. When played in succession, from one end to the other, the bars of the Soundwall produce a melody. A greater spectrum of pitch can be achieved by severing the bars at different points. This method enables the Soundwall to be tuned without removing large segments of railing, which would render it unable to perform its function as a barrier. Bars which are left unsevered do not resonate fully and can therefore be used as percussive rests within the Soundwall's inherent melody line. Our intention in making an element of street furniture musical was not to remove it from its original context or to negate its original function. The Soundwall still functions as a barrier. In an ideal (and not in any way unfeasible) scenario, the railings next to schools, playgrounds and roadside crossings would be Soundwalls; the childhood pastime of running a stick along railings to produce exciting rhythmic sounds is still very much alive (though dormant in most adults) and stands to be encouraged by the integration of Soundwall barriers into buildings and public spaces. Soundwalls would exist as pockets of leisure outside the realm of escapism, to disrupt the notion of leisure time and non-leisure time as being constrictive polar opposites. This area, between work and play, is the Greyworld we speak of. The melodies contained in the bars of a Soundwall, although not tangible in their own right, become a feature of the area in which the Soundwall resides. The ability to wield a stick and maintain a steady walking pace is all that is required to release melody from the Soundwall. Naturally, there are further possibilities for those possessed of a degree of traditional musicianship, but the Soundwall is designed to be accessible to all. The first working Soundwall was created on live television (Channel 4s Big Breakfast) in September 1996 and later exhibited at the headquarters of the Royal Society of British Sculptors (RBS) in London. Greyworld have now become members of the RBS



Layer

Greyworlds Layer is an altogether more complex piece on account of its integral custom-built electronics. The Layer takes the form of a 10m x 2m floor covering or carpet which has the ability to translate human movement upon its surface into music. The music created by the Layer depends entirely on the weight, gait and foot size of the individual walking upon it. As any experimental instrument designer will tell you, an essential part of the personality and musical potential of any musical instrument is the nature of the interface between the instrument and its player. The Layer interface is two dimensional, incorporating 36 zones

arranged in 3 rows of 12; the division of the zones is not visible to the player/stroller and furthermore, the sampled sounds triggered by each zone are not tonally or timbrally homogeneous. As the Layer is MIDI-based, any sounds can be assigned to the zones. Sounds are emitted by a set of six active loudspeakers which encircle the Layer. Each loudspeaker is exclusively responsible for the sounds triggered by any 6 of the 36 zones. In addition, different sounds are assigned to different levels of velocity or pressure. In fact, if two individuals were to walk consecutively on the Layer it is probable that one would not be able to recreate the music created by the other on account of their weight difference and the different ways in which they walk. The Layers arrangement of zones eschews formulated methods of tonal arrangement and seeks to facilitate the creation of more unusual, unique and entirely personal rhythmic and melodic structures. Such accessibility presents many possible applications. For example, it could be used as a catwalk upon which models would make their own music as they walked, rather than relying on pre-recorded music. The Layer has been commissioned to open the Greenwich and Docklands International Festival 1997 (where it will be installed in the foot tunnel, running underneath the Thames river) and will be appearing at the Surfaces exhibition in New York in 1997. The Greyworld album Various Walkers: *Layer Music* (GREY003) has been released, featuring 10 journeys across the Layer.

Greyworld has designed many different sculptural / musical pieces. If you would like further information about Greyworld, or would like to be kept informed of our forth coming exhibitions, please write to the address below. Greyworld's dossier of projects to be exhibited in 1997-98 is also available.

GREYWORLD DISCOGRAPHY (including affiliated labels)

Plate Tectonic: *untitled* (TONIC001 — 2 track vinyl only)
Andrew Shoben: *Radio Moonlight* (GREY001/2 — CD & vinyl album)

Plate Tectonic: *Popcorn* (TONIC003 — 4 track vinyl only)

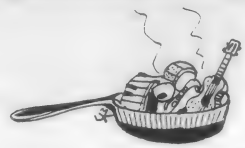
Greyworld: *Division Óne* (GREY302 — 2 CD set [requires 2 CD players])

Various Walkers: *Layer Music* (GREY003 — CD & vinyl album)

Lopez: *The No Variations* (TONIC004 — 4 track vinyl only)

For more information, or to receive the new Greyworld dossier, please contact:

Greyworld Sound Installations, 34, Montpelier Vale, Blackheath, London, SE3 0TA, United Kingdom. E-mail: info@greyworld.demon.co.uk. Web site: http://www.greyworld.co.uk



NOTICES

Affordable bamboo and gourd instruments made by us from American bamboo and gourds. Percussion aerophones, panpipes, didjeridu, drums and shekere ... Send for price list: alaBamboo Music, 3447 N. McGehee Rd. #111, Montgomery AL 36111. [12-3]

ORDER THE MUSIC OF THE GRAVIKORD, Bob Grawi's electric double harp based on the African Kora (featured in EMI, April 1988, and Bart Hopkin's new book *Gravikords, Whirlies and Pyrophones*). Cassette tapes $10; CDs $15 (+1.50 s&h) to White Bear Enterprises, PO Box 106, Florida NY 10921; 914/651-2327.[12-3]

Earthshaking Music '97 "World Music Source" is now available (Free!). 400+ cds, books, videos and cassettes. Instruments from everywhere! Submissions of research papers, videos, recordings, instruments, etc weldomed for inslcuision in our catalog. Email to erthshkn@avana.net or call (404)622-0707. [12-3]

CALL FOR SCHOLARLY PAPER PRESENTATIONS at PASIC '97: The Scholarly Papers Committee of the Percussive Arts Society is calling for research proposals for presentation at the Percussive Arts Society International Convention (PASIC '97), November 19-22, 1997 in Anaheim, California. A completed application must be submitted in addition to three copies of an abstract of approximately 750 words summarizing the research project. For more information, or to request an application, contact Kathleen Kastner, Wheaton Conservatory of Music, Wheaton, IL 60817; phone 630/752-5830, fax 630/752-5341; e-mail Kathleen.Kastner@wheaton.edu. Application deadline 4/1/1997. [12-3]

Research Papers in Violin Acoustics 1975-1993, has been published by the Acoustical Society of America. Edited by Carillon Maley Hutchins with Virginia Benade, Associate editor; 120 definitive research papers with an annotated bibliography of over 400 references. Available from Catgut Acoustical Society, 112 Essex Ave., Montclair NJ 07042-4121, cost $155 ($120 to CAS members). [12-3]

PHOTOGRAPHS OF GOURD MUSICAL INSTRUMENTS WANTED: A new book, *Gourd Musical Instruments*, is being written by Ginger Summit and Jim Widess, authors of *The Complete Book of Gourd Craft* (Lark Books, 1996). The authors are soliciting instrument makers to send photographs of instruments, both traditional and non-traditional, in which the gourd is an integral part of the instrument. Send to Jim Widess or Ginger Summit, 926 Gilman St., Berkeley CA 94790. Photographs will be returned upon publication of the manuscript in 1998.[12-3]

The new book *Harry Partch: The Early Vocal Works 1930-1933* by Bob Gilmore can be ordered in the USA or Canada from the American Composers Forum, or in Britain from the British Harry Partch Society, 33 Arthur Rd., Erdington, Birmingham, Great Britain B24 9EX.[12-3]

The Oakland Museum of California (1000 Oak St., Oakland, CA 94607-4892) presents *Hello Again: A New Wave of Recycled Art and Design* from Feb 15 through July 27, 1997. The show is an exhibition of innovative and often surprising products created from recycled and reused materials, and will include, among other things, a number of musical instruments. For information, call 510/238-2200.[12-3]

For the best in automatic musical instruments, calliopes and fairground organs, as well as lots of other early Americana, look to the books and recordings from Marion Roehl Recordings, 3533 Stratford Dr., Vestal NY 13850-2222; phone 607/797-9062; fax 607/797-2624. [12-3]

UNUSUAL MUSICAL INSTRUMENTS WANTED especially mouthblown. Dr. Guy Grant, Bigfoot Music, 127 Sorell St., Devonport, Tasmania 7310, Australia. Ph/fax Australia 61 (3) 64 24 4957; guygrant@tassie.net.au [12-2]

T.V.F., a video production company, makes videos of performance, happenings, events, installations, intermedia art, dance, theater, the borderline between music & sound & visual art. In the "Other Sounds" section of the T.V.F. catalog can be found documentation of works by Hugh Davies, George Maciunas, Moneik Darge & Willem-Godfried Raes, Hans van Koolwijk, Max Eastley, Stephan von Huene, Joe Jones, and many more. T.V.F.

distributes only to educational institutions, festivals, museums, and artist-run organizations. For information contact T.V.F. at Viktoriagade 7 DK-1655 København V, Denmark; Ph/fax (...45) 31 24 59 87. [12-2]

ANONYMOUS FAMILY REUNION. I ("anonymous") think of everyone who's ever chosen to be "anonymous" as being part of the same "family." Whether people have been "anonymous" because of sex role oppression, possibility of criminal prosecution, rejection of egoism, mysteriousness, obscurity, sense of humor, or whatever, we have our "anonymity" in common — & I think it's time we met. Therefore, I propose a "Family Reunion" for the summer of 1997 to be at a location & time collectively decided on. Special accommodations can be made for those desiring secrecy. Please contact "anonymous" at 3809 Melwood Ave, Pittsburgh, PA, 15213, USA. [12-2]

KENTUCKY KALIMBA FOR TWO — unique design, pentatonic scales on both sides for two players simultaneously! Hand-crafted walnut, 8 spring-steel keys, tuning marks for easy alignment. $50, $60 with gourd resonator. From Gregory Acker, 518 E. Kentucky St., Louisville, KY 40203 (502) 585-5134. [12-1]

THE WORMHOLE ... One of a kind, diamond in the rough? store in WPB, FL, seeks unusual musical instruments for consignment purposes. Please write ... or call ... Steve Rullman c/o Wormhole, 115 So. Olive Ave., WPB, FL 33401; phone (407) 659-3082. [12-1]

Sing, My Khomus: Jew's Harp of the Sakha (Yakut) People, Eastern Siberia has newly been released on CD by Nihon Koukin Kyoukai (Japan Jew's Harp Association). The texts are in Japanese, Russian and English. The cost for purchase outside of Japan is US $30 including shipping. Payable only with international postal money order; bank checks not acceptable. Send to Leo Tadagawa, Nihon Koukin Kyoukai, 1-12-24 Midorigaoka, Ageo, Saitama 362, Japan; e-mail fm9r-tdgw@j.asahi-net.or.jp. [12-1]

By Geary Thompson:
The Quartal System (introduction, using comparison graphics): $5.00 pp
The Quartal Concept (explanation of evolution and conception): $5.00 pp
The Quartal Guitar (chord and scale fingering reference): $10.00 pp
The Quartal Board (chord and scale fingering reference): $10.00 pp
Quartal, 6462 50th ST., San Diego CA 92120. [12-1]

EXPERIMENTAL AND ELECTROACOUSTIC RECORDINGS FOR SALE. Many unusual titles, such as Harry Bertoia, etc. LPs a specialty. Send for free listing to: SONIC TIGER MUSIC, PO Box 715, Cambridge, MA 02140 USA. [11-4]

WAYLAND HARMAN'S CLACKAMORE — "THE WORLD'S NEWEST PERCUSSIVE MELODY INSTRUMENT." Clackamore $23.00 ppd, PVC case $6.00 ppd, instructional video $20 ppd. PO Box 6444, Boise ID 83707. The Clackamore — a tool for listening to the shape of your mouth. [11-2]

Thoreau's Aeolian Harp music as he heard it at Walden Pond. Tape cassettes of the music from this harp accompanied by songs of the wood and hermit thrushes. Harp reproductions of his own design available in Walnut. Ken Turkington 1-800-692-HARP. [11-2]

Reed Ghazala's **Anti-Theory Workshop** is now offering circuit-bent Incantors, Trigons, Photon Clarinets, Morphiums, Aleatrons, one-of-a-kinds, CDs and collected writings. For Reed's full-color, visually stunning brochure/catalog/fractal artwork depicting 18 instruments, CDs, friendly raccoons and more, please send $1 (or any interesting tidbit of your choice) to: Reed Ghazala c/o **The Anti-Theory Workshop**, Sound Theater, 3325 South Woodmont Ave. Cinti., OH 45213. Present web:
http://www.iac.net:80/~cage/reed.html. Coming soon:
http://www.anti-theory.com E-mail: qrg@anti-theory.com [12-3]

GRAVIKORDS, WHIRLIES AND PYROPHONES – a new book-and-CD boxed set from *Experimental Musical Instruments*: The latest and greatest from EMI, produced in conjunction with the publishing company Ellipsis Arts, is a book and CD combination devoted to new and unheard-of musical instruments from some of the world's most interesting and inventive musical instrument makers. Full of informative text describing the instruments and the thinking behind them, wonderful photographs and great music. Every page of the book and every track of the CD overflow with the ideas and the originality of the featured builders. 37 musical instrument makers appear in the book, with music from 18 of them included in the CD. $29.95, for the book and CD (no shipping charges for U.S. air mail or overseas surface rate; add 25% for overseas air; California residents only at 7.25% sales tax), available from EMI at PO Box 784, Nicasio, CA 94946, USA; phone/fax (415) 662-2182; e-mail ExpMusInst@aol.com Visa & Mastercard accepted. [12-3]

Musical Instrument Design: Information for Instrument Making, by Bart Hopkin, editor of *Experimental Musical Instruments*, published by See Sharp Press. The price is $18.95 plus $2 s&h. (This covers air mail shipping within the U.S. or surface rate overseas; for overseas air add 25%. Customers in California add 7.25% sales tax.). *Musical Instrument Design* presents underlying principles for the design and construction of acoustic musical instruments of all sorts, with a practical, hands-on approach. There is no other book like it; no other book gathers this information under one cover. Just under 200 pages long; large format; fully illustrated. Order from *Experimental Musical Instruments*, PO Box 784, Nicasio, CA 94946, USA, phone/fax (415) 662-2182. [11-4]

The EMI Wall Chart is a beautiful 24" x 36" wall poster, with graphic design by Gwendolyn Jones, covered with practical reference information relating to musical instruments and instrument making. Suitable for workshop, living room or art gallery. Some of the material on the chart replicates material in the *Musical Instrument Design* book (see previous ad), but since the wall chart format has its own advantages, you might be happy to have both. The price is $12. (No additional shipping charges for air mail within the U.S. or surface rate overseas; for overseas air add 25%. Customers in California add 7.25% sales tax.) Order through *Experimental Musical Instruments*. [11-4]

Making Simple Musical Instruments: A Melodious Collection of Strings, Winds, Drums & More — A book by Bart Hopkin, editor of *Experimental Musical Instruments*, published by Lark Books. It is a collection of plans for home-buildable musical instruments, ranging in difficulty from simple to moderate. The book is written for a general, non-specialist audience, and the approach is non-technical. The instruments aren't so very far out: most of them relate to familiar instrument types and are playable as such. Yet even experienced experimenters will find some new ideas here. It's hardbound, with 144 big and very full pages, lots of color, beautiful photos & illustrations; price $24.95 plus $2 s&h. (This covers air mail shipping within the U.S. or surface rate overseas; for overseas air add 25%. Customers in California add 7.25% sales tax.) Order from Experimental Musical Instruments, PO Box 784, Nicasio, CA 94946, USA, phone (415) 662-2182. [10-4]

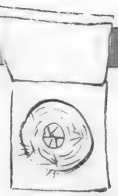
Air Columns and Toneholes: Principles of Wind Instrument Design is a spiral-bound booklet containing the four articles on practical wind instrument acoustics by Bart Hopkin that appeared in EMI in 1992 and 1993. The articles have been much revised and improved, and there are several additional features included. Published by Tai Hei Shakuhachi; available for $14.00. (This covers air mail shipping within the U.S. or surface rate overseas; for overseas air add 25%. Customers in California add 7.25% sales tax). Order from EMI, Box 784, Nicasio, CA 94946. [9-4]

DISPLAY ADS IN EMI are more affordable than you might think. $60/half page, $40/quarter page, $25/eighth page. If you have a product or service that you'd like to promote just a bit more conspicuously, call or write for details: EMI PO Box 784, Nicasio, CA 94946; phone/fax 415/662-2182.

SUBSCRIPTIONS TO EMI: $24/yr for U.S.; $27/yr for Canada & Mexico; $34/yr overseas. Order from EMI, Box 784, Nicasio, CA 94946, USA. Visa/MC accepted.

EMI BACK ISSUES: Bound volume sets Vol 1 through Vol. 10: $17 per volume. Each volume set contains all of the issues of one volume year, photocopied and bound under one cover. The photocopies are a step down in quality from the original press runs, but they are decent as photocopies go, and they are fully readable. Indiviudal back issues from Volume 11 and later are available in the original press run at $6 each. These prices covers air mail shipping within the U.S. or surface rate overseas; for overseas air add 25%. Customers in California add 7.25% sales tax. Visa and MasterCard accepted. Order from EMI, PO Box 784, Nicasio, CA 94946, or write for a listing of back issues and their contents. Corresponding cassette tapes are available for later volumes; see information below.

CASSETTE TAPES FROM EMI: Each cassette in the EMI cassette series contains music of instruments that appeared in the newsletter during the corresponding volume year, comprising a full measure of odd, provocative, funny and beautiful music. Volumes 6, 8, 9, 10 and 11 are available. (Volume 12 will be available after July 1997. Other earlier volumes are now sold out). The price is $8 per cassette. No additional shipping charge for air delivery in the U.S., surface delivery overseas. For overseas air add 25%; in California add 7.25% sales tax. Order from EMI, Box 784, Nicasio, CA 94946. Visa and Mastercard accepted.



RECORDINGS REVIEWS

By Warren Burt, Mitchell Clark and René van Peer

AMEN!: WEAPONS FOR CHILDREN — FROM THE ANTI-CYCLES OF MEGAPHONY

Cassette (tape #6) from Widemouth Tapes, 3809 Melwood Ave., Pittsburgh,PA 15213

Istvan Kantor, aka Monty Cantsin, aka Amen! is an artist born in Hungary who has since also lived and worked in Germany, France, Canada and the USA. The self-proclaimed leader of the Neoist?! movement, he has been active for around 20 years in the fields of performance, mail art, political art, radio, etc. All during this period he has also been active as a sound performer, and in each stage of his activities, he has combined his revolutionary (anarchist?) politics with revolutionary artistic aesthetics.

This cassette documents 17 excerpts from performances between 1990 and 1992, where he performed using a megaphone through various effects boxes, appropriating a device used normally to control crowds for his own agit-prop noise-making purposes. As he says in the notes to the album, "My intention has been to turn the megaphone into a primitive sound alternating device, a radical accessory of noise performance. By sucking, blowing, licking the mouthpiece of the megaphone I produced unexpected and surprisingly new physio-acoustic sounds. With digital signal processors then I increased the megaphone's limited voice spectra... The megaphone performance is determined by the necessity of intensive physical movements in relation to the body of the sound. Because the megaphone is mostly used by riot police, demonstrators, or street speakers, its image reflects the accuracy of social unrest, frustration and alert."

The sounds made are raucously, screamingly noisy. Those looking for the ultimate in grunge, in its purest essence, without all those superfluous guitars, drums, vocals, or lyrics, need look no farther. In the words of tENTATIVELY, a cONVENIENCE, who produced the album, Kantor with his megaphone is "a contemporary trumpeter of doom," and his blasting shreds of feedback are an angrier non-verbal analog of the works of anarchist poets such as Hakim Bey. Each of the tracks is short, and surprisingly, there is quite a bit of variety within them. Some of the most interesting moments for me were the sudden shift into phase-shifted sounds in "Ways of talking loud," the third track, and the fragmented scraping sounds on track 14, "Forbidden Philosophers." Older rock fans may also be reminded of the feedback work of Jimi Hendrix, but here the noisebands have a much darker cast to them.

This is clearly an "M" rated album. Don't play it to your 14 year olds. (They'll probably play their copy to you!) And it definitely won't please those who are looking for relaxing lounge music. But if your tastes run to noizak, live electronic performance with simple, low cost electronics, radical movements in the contemporary visual arts world, or you're curious to see what could have happened had the revolutionary political and artistic ideas of the early 20th century successfully (?) combined, and not been crushed by Stalinism, Fascism, and Commercialism, you should give Amen! a try.

—WB

KENNETH GABURO:
ANTIPHONY IX (...A Dot...) & ENOUGH! — (not enough) —

Music and Arts CD-832, available from Philip Blackburn, Lynceus Press,556 Ashland Ave, #3; St. Paul, MN 55102 ($15 + $3 S/H)

Kenneth Gaburo (1926-1993) was one of the leading experimental composers of the later half of the 20th century. Known mostly for his work with electronics and the voice and language (he invented the term "compositional linguistics"), he was also a philosopher, social critic, and teacher of great influence. This CD presents two of his major compositions from the 1980s, "Antiphony IX (...A Dot...)" for orchestra, children and tape, and "Enough! — (not enough) — " for forty voices and percussion. In both of these pieces, Gaburo sets out to remake the social nature of the ensemble. "A composition cannot be experimental, to say nothing of radical, if the composition of an orchestra, say, by its nature, isn't," he wrote in his essay "LA," and in these pieces, a changed social organization produces new musical results.

"Antiphony IX" uses a graphic score produced by Gaburo as a result of a sensory-deprivation experiment, and this score is performed both by the members of the orchestra, and by the children who sit among them, alternating in episodes with the electronic tape. The sounds that result are varied, sparkling, and scattered like stars or plants in the desert. Traditional musical logics are not applicable here. Rather, listening to the piece in the way one would hear a sound sculpture is more rewarding. The performance by the University of Iowa Symphony Orchestra, led by James Dixon, with the assistance of the Iowa City Boys Choir and the Girls Choir of Iowa City is intense. It's an irony of contemporary musical life that in order to get an experimental piece like this played properly, Gaburo had to work with amateur groups, as the piece proved conceptually too difficult for professionals.

"Enough! — (not enough) — " is a piece for choir and percussion. Each choir member has their own self-made percussion instrument, which augments the performance by percussion virtuoso Stephen Schick. The text, which Gaburo sets in a highly critical way, is the final speech of Benjamin Franklin in the Federal Convention before the ratification of the US Constitution. The choir chants, speaks and sings the text, word by word, in an intentionally ragged kind of almost-unison, creating, with the percussion, a very complex kind of "murmur." Here, the performers used aural cues, rather than being conducted, and this resulted in a more "democratic," if you will (and sonically more "messy" and definitely fascinating), sound texture, one that more accurately reflected Gaburo's political ideas. In both pieces, Gaburo seems to be making the case for a sense of non-unison as being both more representative of the democratic politics he was interested in, and more interesting as sound in its own right. The CD was produced by Philip Blackburn, who also prepared the vocal ensemble for the recording.

This is an essential CD for those interested in: combinations of electronics and acoustic instruments; intersections between contemporary philosophical and political thinking and music; alternative dynamics for contemporary performing ensembles; notions of text-setting and language; and composition as a serious and investigative, speculative activity, rather than simply as entertainment. Gaburo's important work is vastly under-represented on CD. Let's hope this CD is the first step in correcting that imbalance.

—WB

Q. R. GHAZALA: **THRENODY TO THE NEW VICTIMS OF HIROSHIMA: THE FIRST INSECT SYMPHONY**

Realization Recordings CD RZD-022, from Realization Recordings, 9452 Telephone Road, #116, Ventura, CA 93004

Reed Ghazala's articles on circuit-bending, the modification of commercial electronic circuits for experimental ends have long been a

regular feature of *EMI*. How refreshing, then, to finally hear music made by him using one of his instruments, the Vox Insecta (described in *EMI*, vol IX, No. 1 Sept. '93), a three voice "insect voice" synthesizer, with an attached reverb and delay unit. The album as a whole is a work of art — the photographs, the texts, the layout, and the music all mesh together in a striking presentation. As Reed explains in his text, the bombing of Hiroshima changed the political landscape of the world so much that we are all now entrapped in the web of consequences resulting from it.

The music is deeply felt, and impressive. Made with very raw electronic timbres, manipulated in slowly changing, simple processes, the music, as the title suggests, deals with such emotions as mourning and anguish, and does so in stately, expressive, even majestic swoops of sound. Low, phasing bass tones and sweeping, gliding clusters of high frequencies combine and slowly progress in the first movement, "Lullaby," while "Cloud of Fire," the second movement, features more complex chattering modulated sounds combined into textural clouds. The third section, "Untitled in Remembrance of Hiroshima's Unnamed Dead," is similar in sound to the first movement, but has a more shaped and directional form than that movement, which tended to change slowly within rather tight musical limits. The fourth section, "In the Arms of Angels," like the second, has both complex sounds and form. Some of the most affecting moments in it are the solo reverberated glissandi of single oscillators, succeeded by breath-like clusters of diving tones. The fifth movement, "Rejoice," is the most insect-like of the five. If I have any criticism of the piece and/or instrument, it's that the timbres in the first four movements, while effective, don't sound insect-like to me. But the fifth movement, with its extremely static nature, and its very limited frequency range, does suggest insects to me — the sounds of insects on an otherwise deathly quiet evening, waiting to rebuild what's left.

This CD is clearly not music for everyone (what CD that we review here ever is?). But for those interested, Reed's combination of an almost Romantic expressivity with his slowly changing, block-like manipulation of the Vox Insecta's raw electronic timbres will provide a moving musical experience.

—WB

RON NAGORCKA: **SECRET PLACES**

CD from Ron Nagorcka, RSD 999A, Birralee, TAS, 7303, Australia

CHESTER SCHULTZ:
WITHIN OUR REACH — A Symphony of the Port River

winDmud 1, CD from Chester Schultz, 18 Charlton St., Exeter, SA, 5019, Australia

"The bush," the mythical, untamed wildness of raw nature, is one of the central myths of Australia. In reality, more than 80% of Australians live in cities of one million or more, and for many inner city dwellers, their closest contact with the bush is in nature documentaries on TV. Despite that, the bush is one of the central symbols in the culture, and it's not surprising to see some Australian composers heavily involved in making music with the sounds of their environments. And when the continuing presence of Aboriginal culture and philosophy are added into the intellectual mix, the result is often a unique approach to the perception and use of environmental sounds. These two CDs show very different, but philosophically related approaches to two very different environments. Both Ron Nagorcka and Chester Schultz are very concerned with the sonic ecology of their homes, and the implications of that ecology. Nagorcka does live in the bush, on a mountain in a remote part of northern Tasmania, about an hour's drive away from the small, elegant towns of the island's northern coast. Chester Schultz, by contrast, lives in the seaside industrial district of Port Adelaide, about as urban as you can get. Both composers, though, are intensely concerned with the sonic nature of their own local areas, and have done much recording, composing, and performing "within their reaches."

Nagorcka's album is an ornithologist's delight. It opens with three short pieces for sampled bird calls and instruments. In each of these, the just-intonation tunings used, and the structures of the melodies are derived from the birdcalls used in that piece. This results in some very quirky and strange melodies which take some getting used to. Once that happens, however, the melodies have a charm all their own. My favorite of these pieces is "Cockatoo," for soprano saxophone, sampler, and cockatoo sounds. How Ron derived those funky, hilarious theater-organ-like progressions from the gloriously raucous screeching of the Sulphur-Crested Cockatoo is beyond me, but I'm grateful that he did. The centerpiece of the album is a 30 minute soundscape, "Life on Black Sugarloaf." This is a mix of environmental sounds recorded over six years on the remote mountain where Nagorcka lives. Most of Tasmania's forest birds, as well as a wide variety of its frogs, mammals and insects are represented. There is even a chart which lists the 60 species represented and shows when they appear and how loud they are in the mix. As a nature documentary, the piece is invaluable. As "slow motion musique-concrete" (to use Nagorcka's own description of environmental soundscapes), it's a wonderful listen. The album concludes with an effective five-movement suite, "Secret Places," based on the environmental and bird-life sounds of a particular forest on Tasmania's northern coast. Here, again, environmental sounds are analyzed for their inherent tunings and melodic contents, and are mixed with the sounds of didjeridu (Nagorcka makes his own), gong, and clavichord (which he also built).

The environment Chester Schultz is concerned with could hardly be more different from Nagorcka's. The tidal inlet now called the Port River, or the Old Port Reach, in Adelaide was once a wetlands paradise, but for the past hundred years has been largely an industrial wasteland. Still, within this wasteland, beauty struggles and even flourishes. Despite being in the middle of an industrial district, it is one of the few quiet places in the inner Adelaide area. The sounds of seabirds can still be heard across the mudflats on the river, and Schultz has recorded, again over a six year period, a wide variety of natural sounds, industrial sounds, community musical performances, stories, and comments about the Port River, its history and development. Although it no longer supports black swans, a wide variety of other bird species still visit the Reach, and they are well represented here. Especially fascinating are the performances that Schultz organized on the mudflats, with people either playing instruments, or else playing on found objects on the flats themselves, such as the rotting hulks of half-submerged barges. Moving and horrifying are some of the stories of the area, one told by Schultz himself about a gunman attacking some homeless people camped on the banks of the Reach (and who was released on a technicality), and the other told by Kaurna Aboriginal woman Veronica Brodie about when her grandmother was thrown off her traditional land (and then arrested for vagrancy!) on the banks of the Reach in the 1890s to make way for a sugar refinery. All these are woven together, and interspersed with a wide variety of environmental wetlands sounds, effectively revealing the cultural and sonic complexity of this place.

Both CDs are accompanied by copious notes and extremely informative booklets. Both are excellent examples of composers concerned with the sonic *and* the spiritual, the musical *and* the ecological/political. Both make compelling listening — I couldn't stop listening to either — and both are recorded beautifully. If there is a distinctive Australian compositional and conceptual voice developing, these two CDs are prime examples of the kind of sensibility it will have.

—WB

HAL RAMMEL: **ELSEWHERES**

Penumbra CD001. Available on CD from Penumbra Music, P.O. Box 282, Grafton, WI 53024

Hal Rammel is a composer and builder of experimental instruments who has often contributed to *EMI* — his electroacoustic sound palette is described and shown in Vol.VIII, No 4, page 13. The sound palette is an instrument made from an artist's palette to which have been added wooden rods, standing perpendicularly on the palette. As such, the sound palette is reminiscent of a nail violin, but it goes much further. Amplified by a contact microphone, the palette is sounded by a wide variety of means,

including bowing and plucking the rods, placing other soundmakers of various kinds (wine glasses, for instance) directly onto the palette itself, and so on. In performance, digital processing contributes to the electroacoustic sound palette creating richly layered textures. Hal Rammel's solo album *Elsewheres* is devoted to the music of this beautiful instrument.

The work on *Elsewheres* is very mysterious, and the very nature of that mystery changes with each new listening. These sounds suggest certain things — birds' twitterings, human groanings, subway car's squeakings — but what is most compelling about this work is not what the sounds themselves may suggest, but how the process of listening to them — their unfoldings, their deaths — gives rise to questions on the origins of sounds, of music, of social communion through sounds and music. It doesn't *answer* such questions, but keeps them alive and allows for further meditations on the subject. This is an instance of music-making in which creation is not so much a matter of inventive improvisation, but of a music coming into being at a more primary level.

— MC

BENIN: RYTHMES ET CHANTS POUR LES VODUN

On CD from VDE-Gallo. CD-612

YORUBA DRUMS FROM BENIN, WEST AFRICA

On CD from Smithsonian/Folkways. CD SF 40440

RHYTHMS OF LIFE, SONGS OF WISDOM: AKAN MUSIC FROM GHANA

On CD from Smithsonian/Folkways. SF CD 40463

DRUMS OF DEFIANCE: JAMAICAN MAROON MUSIC

On CD from Smithsonian/Folkways. SF CD 40412

CARIBBEAN REVELS: HAITIAN RARA AND DOMINICAN GAGA

On CD from Smithsonian/Folkways. SF CD 40402

RHYTHMS OF RAPTURE: SACRED MUSICS OF HAITIAN VODOU

On CD from Smithsonian/Folkways. SF CD 40464

One might well think that the Smithsonian/Folkways label has a special department for drum-related music, with historically linked subdivisions for West Africa and the Caribbean. The albums released on related subjects cover as wide a range in approach as they do geographically. One of the most recent issues, number 8 of an ongoing series produced in cooperation with the International Institute for Traditional Music, highlights cult drumming styles from Benin in a somewhat scholarly fashion. Others are rather more juicy, up to and including Haitian rock bands rooting in Vodou rituals.

Undeniably *Yoruba Drums from Benin* is a dry album. The commentary does not specify the circumstances under which the tracks were recorded, but my guess is that recordist Marcos Branda Lacerda took the ensembles apart to achieve the best possible sound quality. Separated from the occasions that it is intended to support, this music does not breathe the enthusiasm one would readily associate with African cult music. On the other hand this CD does present a detailed view of how the musicians in the smallish *bata* ensembles play their different parts. One player improvises over a steady beat maintained by at least two drummers. Another is free to switch roles from time to time — now providing a ground rhythm, now playing variations on it. With the music examples in the booklet these various lines are relatively easy to make out. Timbral and tonal differences between the instruments have been captured with admirable clarity. Three tracks present the *dundun*, an hourglass shaped talking drum that follows the inflections of the Yoruba language and produces convincing 'l'-s and 'r'-s. Lacerda regrets that he cannot transcribe the musical references to spoken language satisfactorily.

Relations between talking drum and speech are to be heard on *Rhythms of Life, Songs of Wisdom*. One track features a tribute to the king of the Denkyira region, every line translated into beats on two drums tuned to different pitches that perceptibly reflect tone and rhythm of the text. If *Yoruba Drums* constitutes a skeletal compilation, this CD and *Rythmes et Chants pour les Vodun* each in its own way put flesh and blood on the bones. *Rhythms of Life* shows how the drum ensemble can be the motor and the support for choral singing, how it fires the performance of a brass band. It provides the basis for a song in which a chorus and a band of *abeng* (horns) take turns, the latter playing the melody of the singers — another instrumental rendering of speech intonation. This CD lists over thirty instruments (all percussion, except for the *abeng*) giving a concise description of each. Some striking examples are the *ompehkyen*, the *adaka* and the *dansuomo*. The first is a bass drum often fitted with a pair of breasts, possibly because it is considered the mother of the group. The next is actually a large plywood crate. The last is a water drum exclusively used by women, who are not allowed to play regular drums; this instrument consists of a large hemispheric gourd placed face down in a basin with water. Two women strike the gourd; one of them adjusts the depth to which the gourd is submerged to vary the pitch.

The *Vodun* CD (from the Swiss label VDE) documents ceremonies, linking the drumming to the songs and dances of a cult, from which Vodou originated. I have to add that for this album the performers agreed to stage the proceedings, rather than have the researcher attend and record the actual, secret, rituals. As in *Rhythms of Life*, links between recited text and drumming are evident, especially on two tracks featuring a story-teller. He sings his legends in a rhythm that corresponds to drum patterns played to honor the *vodun* Hevioso. The accompaniment includes hand clapping, chest beating and grunts that together with the recitation emulate the polyrhythms of a percussion ensemble.

The Caribbean CDs portray how the music evolved on the other side of the watershed — people from many African tribes who were uprooted and carried to the Americas to work as slaves there, who intermingled, and underwent influence from European cultures. Two elements that have been retained are the rhythmical complexity of the music and its call and response structure. Closest to African tradition is the music of Jamaican Maroon communities, descendants of escaped slaves who fought and won a guerrilla war against the plantation owners and gained a measure of autonomy. *Drums of Defiance*, a compilation of their music, features instruments played in speech mode — drums and the *abeng*. Most tracks consist of singing with percussion accompaniment. Often one man acts as lead singer, being answered by a high pitched unisono chorus of women. There are lighter and heavier categories of song, respectively used in recreational and ritual contexts. The people themselves consider the latter to be related with their tribal origins. Ceremonial practice related to vodou can be heard on *Caribbean Revels* and *Rhythms of Rapture*. The former highlights the exuberant Haitian Rara and Dominican Gaga festive music, played by bands of percussion and single-note trumpets of varying lengths made of bamboo (*vaksin*) or zinc (*konet*). Melodies are performed with a hocketing technique. The tracks on the other album, subtitled Sacred Musics of Haitian Vodou, range from field recordings to pop songs, such as " Konbit Zaka" by Boukman Eksperyans, in which recent influences from Western popular music are quite strong. The last track is an enchanting melody sung by a young priestess to invoke a spirit. It is part of a private ceremony performed to validate a Vodou passport for David Yih (who recorded six pieces of this CD), a safe conduct to attend gatherings.

The cult evolved from a variety of African origins to which European elements were added; the music has followed the same pattern. Not only do these albums trace parts of the lineage, they also testify to the tenacity of these people that has given them the strength to retain and build a vivacious culture in severe adversity.

— RvP

works, often in conjunction with sculpture or environmental installations.

"New Music on World Instruments" by Randy Raine Reusch, also in *Musicworks* 66.

This short article introduces what will be a series in coming issues of *Musicworks* on contemporary composition for instruments rooted in folk traditions.

"Taking Ideas for a Walk: A Discussion with Australian Composer Ion Pearce" by Nicholas Gebhardt, also in *Musicworks* 66.

Ion Pearce's compositions, for dance and video as well as pure sound, are built around a series of instruments he has made, including various sorts of drums, gongs and bells, some mechanized.

CAS Journal Vol 3 No. 2 (Series II), Nov 1996 (112 Essex Ave., Montclaire NJ 07042-4121) contains articles on facets of violin family acoustics, including resonance tuning, analysis of body dimensions, analysis of bowed string vibration patterns, and more.

"The Jacaltec Maya Guitarria" by Carol Ventura, in *American Lutherie* #47, Fall 1996 (8222 South Park Ave., Tacoma, WA 98408-5226).

A detailed description, with lots of photographs, of the construction of this small Guatemalan guitar.

"Classic Guitar Intonation" by Greg Byers, also in *American Lutherie* #47 (address above).

A highly mathematical approach to calculating fret placements, taking into account the slight stretching of the strings when they are pressed against the fingerboard. Arriving at different ideal fret locations for different strings, the author offers ideas on how to accommodate this with different slight "setbacks" for each of the strings where they cross the bridge and the nut.

"Amplifying Acoustic Instruments" by Harry Fleishman, also in *American Lutherie* #47 (address above).

A primer on mics, piezos and magnetic pickups, with underlying theory well balanced by a concern for practical results and individual tastes.

Several articles of interest appear in *Noisegate* #4 (150 Scott Rd., Pitsmoor, Sheffield, S4 7BJ, England), including —

"On the Psychology of Timbral Development in Western Music" by Maxwell Steer: esoteric theorizing on the factors contributing to people's perceptions of and responses to timbre.

"The Perception of Space in Music, Part 1" by Peter Lennox: This opening article in a series begins with a discussion of the current situation: that equipment for high-quality capture and reproduction of the spatial dimension in music is feasible but few musicians make it a high priority to exploit the possibilities, and not much music is currently composed with the effect of the spatial dimension in mind.

"Pyrotechnic Sound" by Nick Sales: A discussion of the sonic aspects of fireworks, with some technical information and suggestions for further reading.

A British patent from 1900 for an acoustic (that is, non-electric) hearing aid worn on the back of the head.

"Atmospheric Electrical Recording Part 2: Radio Emissions from the Sun" by Joe Banks: More adventures in radio astronomy, with social and aesthetic observations mixed with technical information in a personal narrative style.

"Bastiaan Maris: Hot Pipes," by Paul Burwell: a description of the Large Hot Pipe Organ, a large-scale computer-controlled pyrophone whose sounds come not from standing waves set up by a continuous heat source, but rather from controlled explosions within the pipes.

The following is a list of selected articles relating to musical instruments which have appeared recently in other publications.

"Snares" by Rob Courtney, in *Not So Modern Drummer* Vol. 8 #6, Sept/Oct 1996 (500 Lafayette St., Nashville, TN 38203-4225).

A history of the snares used in snare drums, from the early gut snares to modern coiled wire snares, with other types in between.

"My Development of Improvisation Through Sound Sculptures (extracts from a book in progress)" by Max Eastley, in *Rubberneck* 23 (21 Denham Drive, Basingstoke, Hampshire RG22 6LT, England).

The British sound sculptor and performing musician Max Eastley recounts the development of his work and ideas over the last 30 years, and in doing so touches on several others traveling a similar road, including David Toop, Hugh Davies, Evan Parker and others. Motion, tactility, sound both abstract and associative, and the mechanics of group interaction are central themes.

"Soundbeam, Fractal Bridge and Improvisation" by David Jackson, also in *Rubberneck* 23 (address above).

The author describes Soundbeam, a modern theremin-like instrument that responds to movement within its field of sensitivity. He discusses a variety of approaches he has developed for using the instrument and extensions or multiples of it, as well as a variety of contexts (social and pedagogical as well as compositional and performance-oriented).

"La Tumba Francesa" by Danile Chatelain, in *Percussions* #44, July/Aug 1996 (18, rue Theodore-Rousseau, F-77930 Chailly-en-Bièrre, France).

An extensive and extensively illustrated report on Caribbean tumbas (relatives to contemporary conga drums). [In French.]

"Peruvian Whistling Vessels: Pre-Columbian Instruments that Alter Consciousness through Sound" by Don Wright, in *Open Ear* Volume 3, 1996 (PO Box 10276, Bainbridge Island WA 98110).

A report on multi-chambered clay pots made in pre-conquest Peru which produce a whistling tone. The author believes that the sound of these pots has special healing qualities, and the article primarily discusses his experiences with them in this context.

"In This Corner" by Matthew James Redsell, in Continuo Vol 20 #5, December 1996 (29 1/2 Sheather St. #4, Hammondsport NY 14840-0327).

In this edition of his regular column, the editor of Continuo presents photos of a Lautenwerk (gut-strung historical European keyboard instrument), a keyed monochord (alternately described as a one-string clavichord), and a pair of additional clavichords, all by the contemporary maker Thomas Ciul.

"The Phantom of the Brain Opera" by Scott Wilkinson, in *Electronic Musician* Volume 13 No. 1, January 1997 (P.O. Box 41525, Nashville TN 37204).

"Hyperinstruments" are musical instruments with enhanced sensing mechanisms. *The Brain Opera*, an opera in three movements, is created in part by audience interaction in the "Mind Forest," containing hyperinstruments developed at the MIT Media Lab. Hyperinstruments discussed include the Rhythm Tree, Singing Tree, Melody Easel, Harmonic Driving, Gesture Wall and the Sensor Chair.

"Inside Sabian's New Cymbal Plant," no author credited, in *The Music Trades*, November 1996 (80 West St., PO Box 432, Englewood NJ 07631).

A factory-floor tour of a new plant for mass production of cymbals.

"They Were Great Guitars ... It's Just No One Bought Them: A Gallery of 'Innovations,'" no author credited, in *The Music Trades*, Oct 1996 (address above).

In a condescending tone uncharacteristic of this magazine, this article mockingly dismisses several recent forays into innovative guitar design, including the Dynachord MIDI controller, the Born To Rock all aluminum guitar, some electric guitars with highly carved or sculpted bodies, and several more. In the following December issue of the same magazine, the maker of the Born To Rock guitar responds with an angry letter to the editor which, in addition to defending his product, addresses in a serious way some of the issues involved in innovative instrument design for popular markets.

"Stringband Evaluation (Part Eight)" by Joseph Jourdain, in *Folk Harp Journal* #93, Fall 1996 (4718 Maychelle Drive, Anaheim CA 92807-3040).

In this continuation of a long-running series on string scaling, the author puts aside technical questions. Instead, he addresses, with some sensitivity, the question of what sounds good to whom and, beyond that, what makes a meaningful musical experience.

In the letters section of the same issue of *Folk Harp Journal* (address above) is an extensive communication, complete with photographs, describing a "stringless harp" installed at Adventure Place, a science museum in Akron, Ohio. The harp's sounds are triggered electronically by interruption of laser beams where the strings would normally be.

"Drying Gourds" by Rosemary Dougherty, in *The Gourd* Vol 26 #4, Fall 1996 (PO Box 274, Mt. Gilead, OH 43338-0274).

A straight-forward how-to on drying gourds so that they don't rot.

"Gourd Treasure in Madagascar" by Millie Morton, also in *The Gourd* Vol 26 #4.

This article includes a photo of and briefly describes the *sejy lava*, a Malagasy stringed instrument of wood and gourd.

"High-tech versus My-tech: Developing systems for electroacoustic improvisation and composition" by Sarah Peebles in *Musicworks* 66, Fall 1996 (179 Richmond St. West, Toronto, Canada M5V 1V3).

The author discusses her creative use of available and affordable electronic sound technologies for various sorts of sound

(continued on page 43)